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THE SPHERE

Vol. CLXIV No. 2149 WITH WHICH IS INCORPORATED THE GRAPHIC MARCH 29 1941

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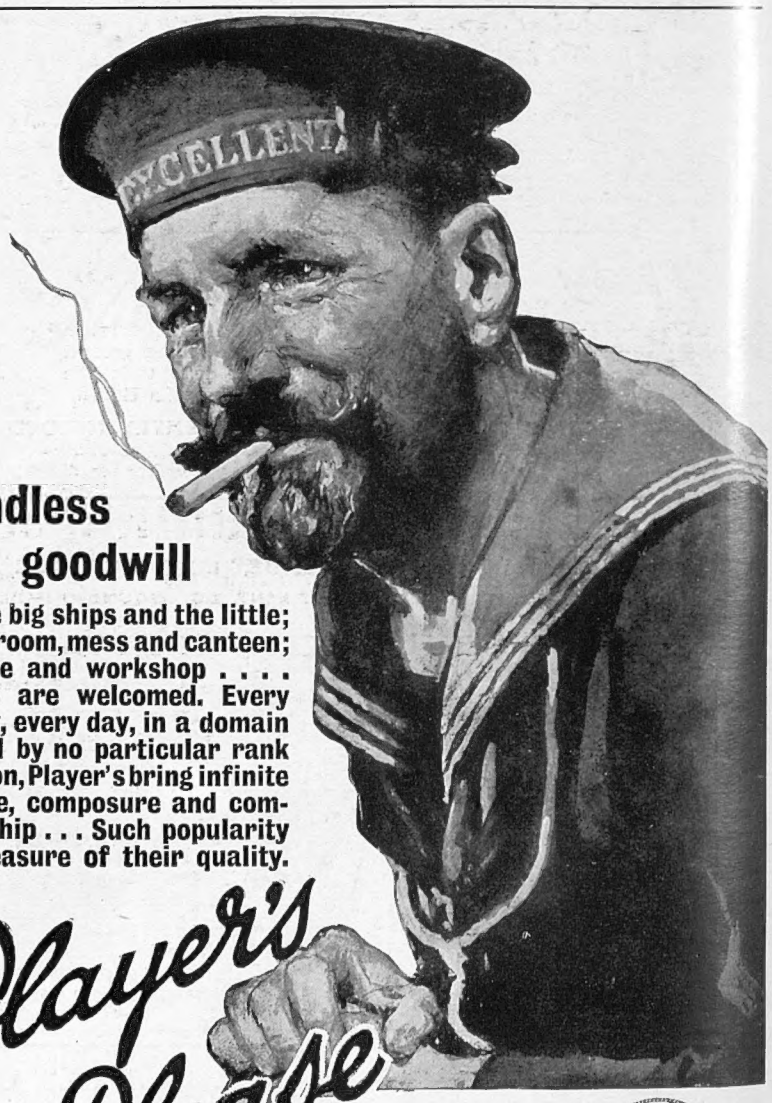

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Volume CLXIV No. 2149 The SPHERE, London, March 29, 1941

THE SPHERE
With which is incorporated "THE GRAPHIC"
The Empire's Illustrated Weekly
London, March 29, 1941

BACK FROM THE DEAD: THE RESCUE SQUAD, AT THE END OF FIVE HOURS, BRING OUT A MAN WHO HAD BEEN BURIED ALIVE FOR SEVEN DAYS AFTER THE HEAVY RAID ON CLYDESIDE

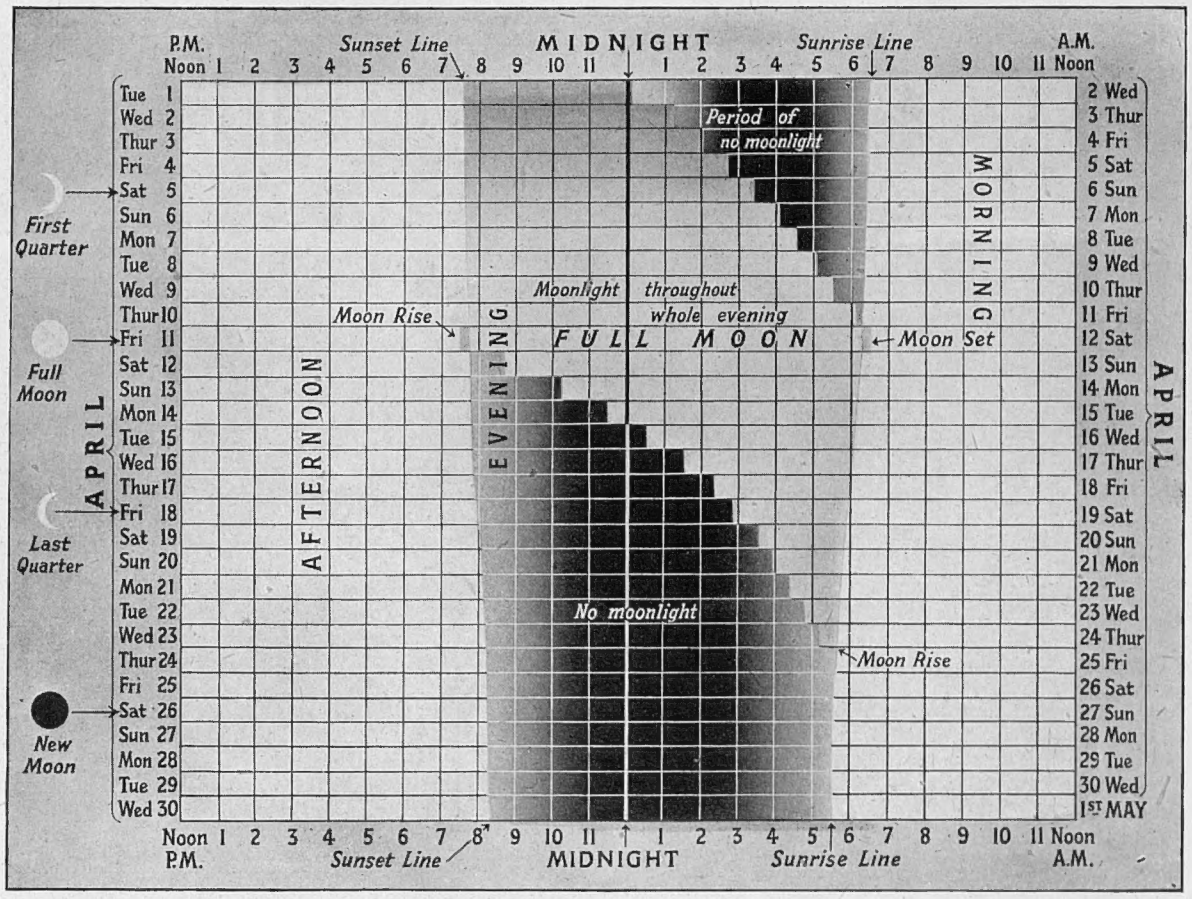
Beneath the debris of a bombed tenement two men lay for seven days before the rescue squads were able to bring them out. One of them, John Cormack, talked to his rescuers while they toiled to reach him, and as he was taken to hospital he smoked a cigarette. The other man, Reserve Policeman Frederick Clark, was heard moaning beneath a pile of wreckage weighing twenty tons. It took five hours to free him, and here he is seen emerging into the light of day again—still alive after an ordeal which doctors declare to be almost unprecedented. Four to five days is considered the limit of human endurance under such appalling conditions as those suffered by Cormack and Clark. Unfortunately, thirty-two-years-old Frederick Clark died some hours later in hospital, but twenty-two-years-old John Cormack has survived and is now thought to be out of danger and well on the way to complete recovery

Postage—Inland, 2d.; Canada and Newfoundland, 1½d.; Elsewhere Abroad, 2d.

A WAR NEWSLETTER —No. 82

1, NEW OXFORD STREET, W.C.1

Our Private Blitz.—Up to now, the enemy has been merely threatening my house. They had dropped perhaps fifty bombs at various times round our parish. But the other night they laid aside the mask, and took their gloves off. Just as we were turning on the 9 o'clock news, that nasty rumble of many express trains rushing through the air was very audible—and a split second later our unpretentious house in Wessex rose and fell again, the windows and doors chattered like monkeys and a series of explosions—far less fearful than we had been led to expect—followed instantly. A few seconds later, looking out through a window, I saw the fearsome spectacle of fires blazing merrily all along the fringe of our little wood at the garden's end. Obviously (I thought) Hitler had decided to liquidate a critic of his policy, and had succeeded in his object. Now for the more cheerful aspect: *High explosives.*—Four high-explosive bombs had fallen in a close square near my rickety house. The craters were as large as any I have seen. Fir trees were uprooted and carried as much as 80 yards. Rocks fell in the neighbouring village settlement. The area round the craters is hideous with an obscene and acrid counterpane of unfamiliar, grey, powdery soil. *But* the bombs missed my water pump, although they cut the pipes which bring up my water. No window glass was broken, and only damaged tiles came down. Even the pump-house windows, not far from a yawning crater, were untouched. In short, this heavy visitation was less terrifying and no more damaging than earlier visitations half a mile away. *Fire bombs.*—Five fire bombs fell in the grounds at the same time. My gardener and another stalwart Home Guard were on the spot *with the right tools* within three minutes, and, joining the A.R.P. men at the village gate, had got all five of them *out* and the fires invisible from the air within seven minutes. *The Children.*—The children were worthy of their race. They positively enjoyed the experience. Brought out of their little beds (or shaken out), they passed two joyous hours, all three of them, on a narrow mattress in the hall, chattering (as the windows did) like monkeys, and telling and retelling their experiences of the Great Blitz. Next day, of course, we were the local peepshow. "Trespassers will be prosecuted" had no meaning for anyone. Souvenirs were the order of the day. In a word, our local blitz might have been worse.



"THE SPHERE" MOONLIGHT CHART FOR APRIL

The first month of spring has its hours of moonlight during its earlier part, with the first quarter making its appearance on the night of the 5th. On the 11th the full moon rises at about 7.30 p.m. and sets a quarter of an hour after sunrise the following morning. The last quarter rises at 8 p.m. on the night of the 18th and sets at 6 a.m. the following morning. The dark band denoting the hours of darkness continues to narrow as the month nears its end and on the last day there are over 8 hours of daylight during the afternoon and evening

A limited number of these charts will be supplied free of charge on application to the Publisher, "The Sphere," 32-34, St. Bride Street, London, E.C.4, but 2½d. in stamps must be enclosed with the application

Berbera Comes Home.—Huge as was the area comprised by the Italian African Empire, the least optimistic among us now realises that the end of the widespread campaign to liquidate it is now near. In Libya the remnants of what was once Graziani's great army of invasion, now reinforced by a few German mechanised units, is sandwiched in and impotent between French territory and the deserts which protect Cyrenaica. In the east, the British forces and their Allies have now completely encircled the Duke and his remaining damaged, discouraged divisions. From Keren, Gondar, Debra Markos, Asosa, Mega, Dolo, Kismayu, Mogadishu, Jijiga, Hargiesa, and finally Berbera, our ring of steel invests and pens daily closer in the remnant that remains of Imperial Italy in Africa. French Somaliland remains an island in a sea of war, and that island can offer to the Italians nothing but internment in the hands of their "vanquished" foe. It is all up with the Italian Empire, and in a few weeks many thousands of seasoned, triumphant, supremely efficient troops will be rested and readily available for other fields of glory. It is a triumph with which our military history can furnish few parallels.

Roosevelt, America, and the War.—If there be any war subject about which "topical interest" will linger beyond the week of its rising to importance, it is that of the passing of the Lease-and-Lend Bill and the President's historic utterances which followed. We can now see the tremendous canvas whole; we can see it as a finished picture, and not as a series of studies for a picture. Those earlier studies were tinged with bitterness and disappointment for us. We lost faith in America and in our own friends there because for so long, as the danger grew every day greater before *our* eyes, party and political questions continued over there to raise a fog round the real, stark issue, and to confuse and obscure its sharp outlines. We lost sympathy for our cause in America by our methods of approaching her. Americans resented any hints from Britain as to where their duty lay and what dangers directly threatened them. One sees now that the tactics of the Isolationists were never a main issue. After the rape of Norway and Denmark and the enslavement of the Low Countries, America began to see clearly that this European War touched her nearly and must ultimately threaten her existence as a free nation. That fact her President had clearly seen since 1938. With the discovery of the truth about the war, the American people remained convinced and united in the conviction that no American blood should be sacrificed. The bombing of Britain in August of last year brought about in a few days a startling revulsion of opinion in a chivalrous and even sentimental people. Then, even the parties most opposed to American intervention in any form, revised their opinions of the character and worth of the British Nation.

A Miracle of Our Age.—And, while these great events in the progress of the war reacted on public opinion in America, the President patiently, quietly and with clear vision worked on his own essential task, and planned ahead. It is no use pretending that the democratic institutions of America have their counterpart yet in Britain; our democracy still has roots in older soil and outworn principles. Mr. Churchill's methods of winning British public opinion, of composing our national differences and canalising our national effort, could never be the same as Mr. Roosevelt's vis-à-vis America. They might have quicker results, but the methods must be entirely different. The mills of American democratic evolution and government grind slowly, disappointingly slowly in times of urgent danger, and only a man of clearest vision, utter patience and superhuman statecraft and grit, could have kept his head, kept his heart up, and kept his purpose in view in the face of delays so grievous, side-issues so many, interruptions so frequent, and obstacles so cumbersome. Without the President's ceaseless labours, that Bill would be no nearer to-day than it was in December 1940.

Stalin's Smile and Spring's Smile.—As the mighty struggle gains in intensity, we may be sure the smile on the face of the Russian tiger grows ever broader. Britain knows that for her, while Hitler and Co. reign, there is no enemy but Germany. Hitler knows there is no enemy but Britain, whose victory must ensure the downfall of his dynasty. While a majority of the German race believe in Hitler, the German race believes what Hitler believes—there is no enemy but Britain. The two Great Powers most hated and feared by Stalin have no eyes but for the death struggle between themselves. And the smile on the tiger's face grows ever broader from the lair from which he watches and waits. He knows (none better) that wars breed his own patent and favourite germs and that every month of war enlarges the hot-bed of his germ-nurseries in Europe. He sees—none better—that, while he waits and watches, not only are his chief enemies bleeding themselves white, but in that very job are labouring for his cause, doing his propaganda, painting the map of the old world red for him. The great struggle is all jam for Stalin. He has only to wait, only to keep out, and the world over which he has cast longing, visionary eyes may be at his feet, fall like a ripe plum into his mouth. Hitler alone is preparing the way for the next blood-red revolution which will succeed his own. A tragic plot, God wot. For, meanwhile also, a new spring begins, blossom on blossom (and nowhere lovelier than in Germany), reminding all who have minds to think, of what gifts and joys are offered to mankind, of what is and what might be, of what stands in the way of salvation. The peach blossoms, the almond blossoms, even now, pink clusters under the blue vault of heaven, must be speaking to men in the voice of God. But that voice cannot yet get a hearing.

THE OLD STAGER

IMPORTANT NOTICE TO ALL OUR READERS

As most of our readers must by this time be fully aware, the Publishing Houses of Britain are passing through serious times. Coupled with a curtailment of paper supplies owing to shipping difficulties, all production costs have also risen to a high level.

After months of resistance—despite the steeply rising costs of production—the Proprietors of "The Sphere" have reluctantly been compelled to follow the example of others and raise the price of this journal from 1s., as hitherto, to 1s. 3d. per copy.

Owing also to the urgency of the paper-supply problem, waste must be entirely eliminated. If, therefore, you have been in the habit of buying your copy of "The Sphere" casually, *and have not placed a definite order for it*, you will probably be unable to secure a copy in the future.

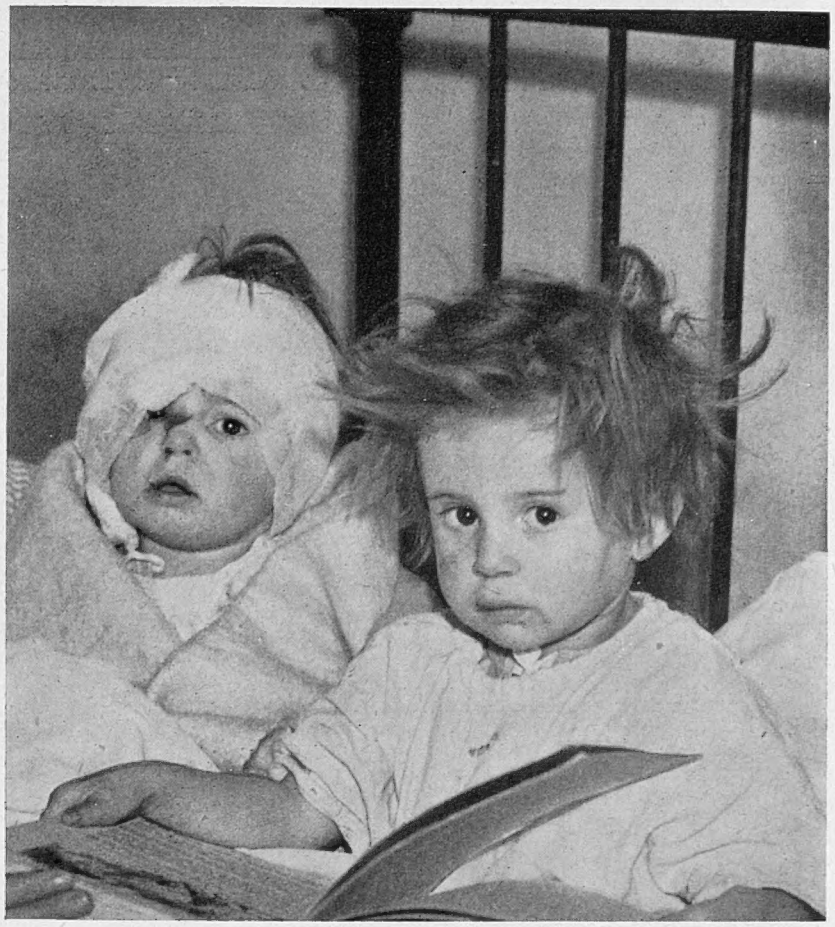
It is to your own interest to place a definite order at once.

We regret the advance in price; we have resisted it as long as was possible; but we have been forced to this step by events beyond our control.

Starting with the issue of April 5, the price of "The Sphere" will henceforth be 1s. 3d. per copy.

THE EDITOR

VICTIMS of the NIGHT BOMBERS



ORPHANED BY BOMBS ON LONDON, AGED ONE AND TWO : Two little babies, Sally Smith, aged two years, and Barbara Smith, aged one, are the sole survivors of a family bombed during the raid on London last week. Their father, mother and brother were all killed. Little Sally, of the tragic eyes, is here seen in hospital showing a picture-book to her sister, whose head was injured. The plight of innocent children, rendered orphans and homeless through the savage attacks of Nazi airmen, is one of the most distressing aspects of the nightly raids on Britain

THE BABY THAT WAS BURIED FOR THREE DAYS : Sleeping peacefully in her hospital cot is this little victim of the bombers. She is ten-months-old Irene Marriott, who was buried for three days under the wreckage of her home in Merseyside last week. Both her parents were killed by the bomb ; and it was the dead body of her father which protected her from the crushing debris. Local doctors consider that the baby's survival is almost miraculous. One arm is in splints and her head, which was badly cut, is bandaged. Little Irene will be adopted by an aunt when she leaves hospital

AFTER THE HEAVY ATTACK ON CLYDESIDE BY NAZI NIGHT RAIDERS : TWO PICTURES OF THE EXODUS OF THE CIVILIAN VICTIMS OF THE BOMBERS

Not only were the Mersey area and London attacked last week, but also Clydeside, which suffered its first real raids of the war. German bombs, hurled indiscriminately on residential areas, claimed some 500 victims, and another 800 injured. In the picture on the left is seen a long line of Clydesiders queueing in the streets for conveyance to new dwelling-places : they were rendered homeless during the two attacks on successive nights. On the right another group is seen, with a few hurriedly salvaged possessions—all that now remains of their homes

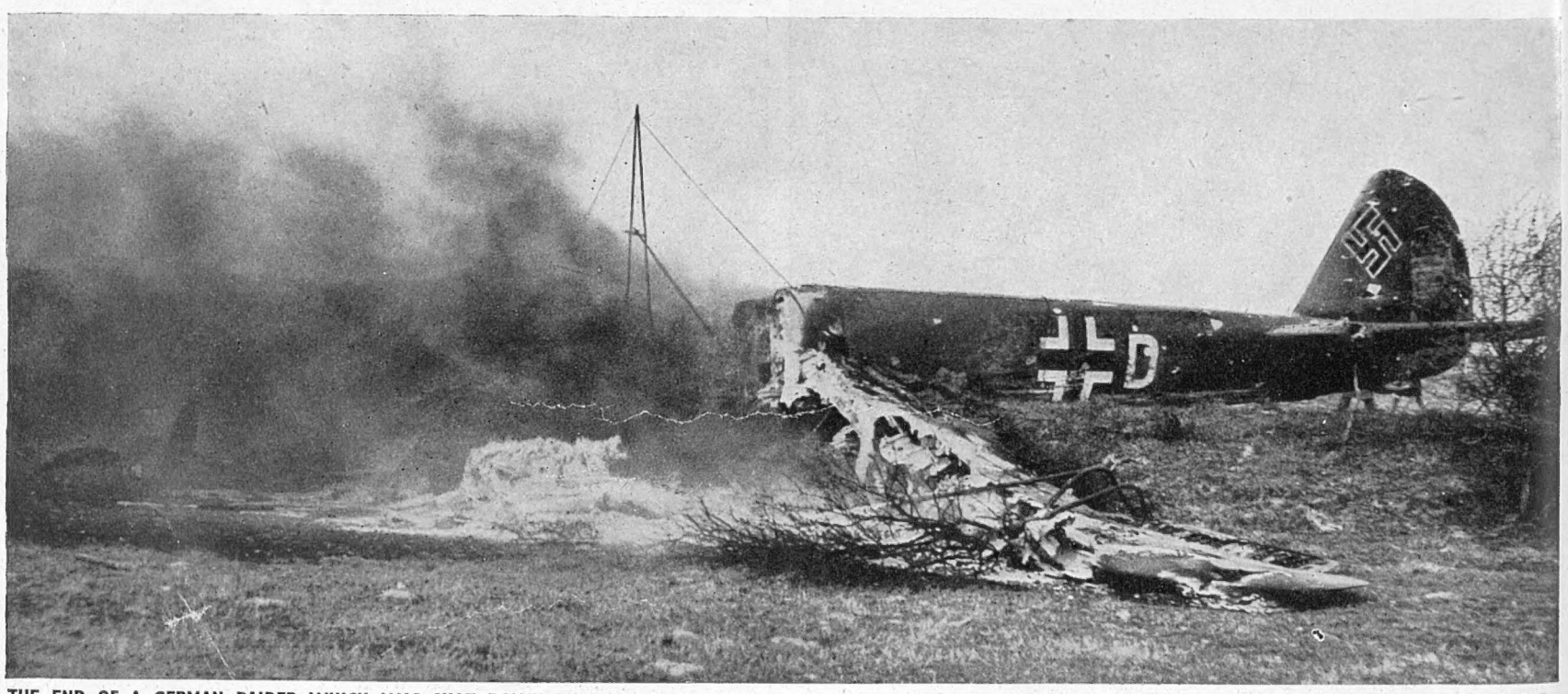
NEWS PICTURES FROM THE HOME FRONT

GERMAN PRISONERS OF WAR ARE STILL PASSING THROUGH LONDON : Here is another batch on their way to the internment camp—captured during raids on Britain. Some are wounded, some are boisterous, some are glad—all are out of the war !

COLOURS FOR THE FREE FRENCH FORCES IN BRITAIN : Frenchwomen kissing the Colours in a West of England town. General Petit (General de Gaulle's Chief of Staff) made the presentation to Lieut. Martin of the Free French Forces

GOING OUT ON A NIGHT RAID OVER GERMANY : The aerodrome officer bids "Good luck" to sergeant-pilots of the R.A.F. at a British airfield before they take off in their great bombing planes for another night "strafe" on enemy territory. Since the beginning of the year our raids have been growing in intensity

THE MAN WHO IS CONSCRIPTING THE WOMEN OF BRITAIN : Mr. Ernest Bevin, Minister of Labour, with Miss Caroline Haslett, Chief Adviser on Women's Work, confer on the new problems created by the recent calling-up of women of twenty-one and twenty-two

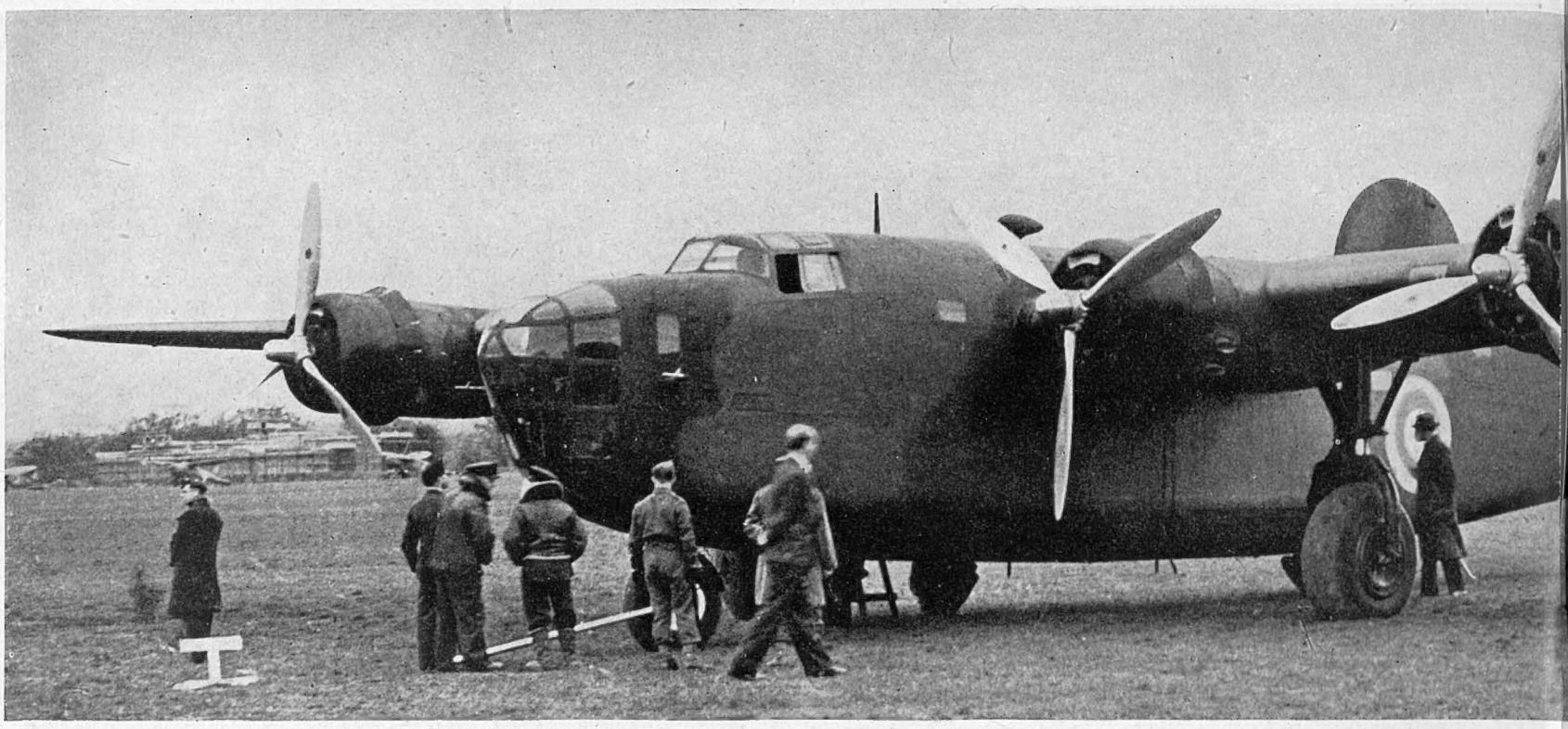


THE END OF A GERMAN RAIDER WHICH WAS SHOT DOWN BY TWO PILOTS NEAR LITTLEHAMPTON : Two R.A.F. pilots who cannot understand each other's speech shot down a Junkers 88 which crashed near Littlehampton. One of the pilots is a Czech sergeant-pilot and the other a South African Flight Lieutenant. The bomber was almost blown to pieces in the sky, but four out of the crew of five were rescued alive from the burning wreckage by soldiers

THE DAY OF NATIONAL PRAYER—A scene at the Mass held in Westminster Cathedral : On Sunday last the King called the whole nation to prayer, and churches of all denominations held special services—many of them in edifices which have been badly damaged by the bombs of German raiders. Throughout the country thousands of worshippers—civil and military—followed the King's example and joined in the observance of a Day of National Prayer. The above impressive picture was taken in Westminster Cathedral, where civilians and soldiers knelt side by side as Cardinal Hinsley presided at High Mass

AFTER A HEAVY RAID ON THE EAST END OF LONDON : With "curlers" in her hair this little girl sits placidly in a shop's shattered window-frame and occupies herself with drawing

AFTER A RAID ON A NORTH-EAST COASTAL TOWN : A little group of toddlers assist in the work of clearing up, by sorting out useful material from the ruins of a dwelling-house demolished overnight by the bombers



A TOKEN THAT AMERICA MEANS BUSINESS!

The First Batch of Liberators which Reached England this Week-End After Having Been

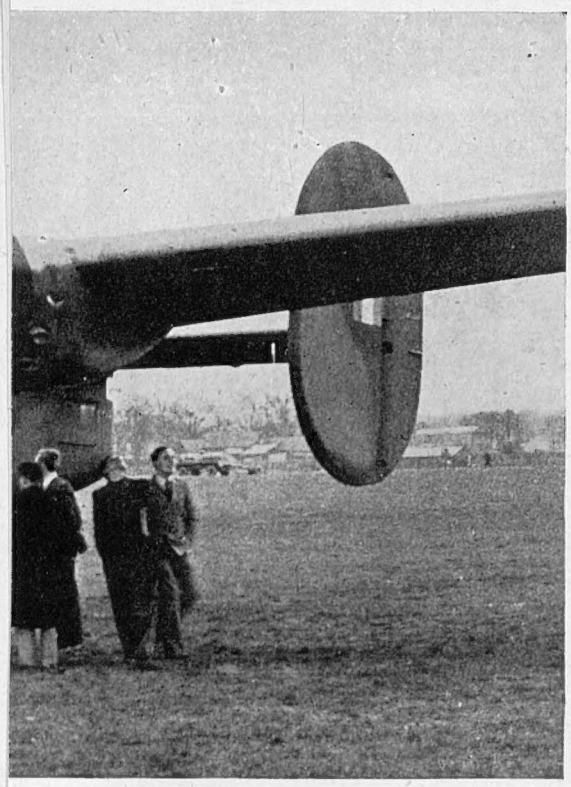
The Liberator is a giant four-engined bomber, used by the United States for long-range bombing purposes. The first batch of these arrived last week-end in England after having been flown across the Atlantic by pilots of the Atlantic Ferry Service. The Liberator has a top speed of 335 m.p.h. at cruising height, and has a range of 3,000 miles. Its wing-span is 110 ft., its length 66 ft. Its engines develop nearly 5,000 h.p. for take-off. It has the new tricycle undercarriage for easier landing at a good speed, and generally it is thought to be amongst the best that America has to offer: the Air Minister has described it as a "high-speed craft with a huge bomb-load capacity." In this respect it out-classes even the huge Focke-Wulf Kuriers which Germany is using in her attempts to destroy our Atlantic merchant shipping. In addition to other things, the Liberators are very heavily armed, and if attacked by fighter aircraft are well capable of looking after

WELLINGTON BOMBERS IN THE MIDDLE EAST, WHICH NOW REINFORCE THE FIGHTING STRENGTH OF THE R.A.F.

Heavy Wellington bombers have, for some time past, been reinforcing the R.A.F. Bomber Squadrons in the Middle East. As evidence of the work this augmented Force is doing, one has only to read the daily newspapers for reports of the continuous and heavy bombing operations at practically every point of importance in Abyssinia, which is now penned in completely and unmercifully pounded every day—and many times a day—by our squadrons. Since the days of our lightning advance through the Western Desert the Italians have almost been swept from the skies; much of this is due to the bombing of their aerodromes and bases carried out by the Wellingtons. The crew seen in this picture are shown "kitted," ready for the take-off. The heavy flying boots and cut-down flying suits contrast oddly with the shorts of the Tropics! Note the drawing of Winston Churchill as Santa Claus on the aircraft itself—complete with cigar!

THE NIGHT FIGHTERS OF THE R.A.F.

The Men Who Battle by Moonlight: The Arrival of the New Liberator from the United States: and the Wellington Heavy Bombers in the Middle East



…n Across the Atlantic

…emselves. No place in Germany is outside the range of this new …craft. When they go into operation with our own native-built …craft, Britain's bombing forces will truly be formidable. It is …ted that additions to their numbers will now be made regularly … direct cross-Atlantic flights

NIGHT-FIGHTER PILOTS "IN READINESS" WEAR DARKENED GOGGLES IN THE REST HUT SO THAT THEIR EYES SHALL BE ADJUSTED TO NIGHT CONDITIONS WHEN THEY GO INTO THE DARKNESS OUTSIDE TO TAKE OFF

…Y THE LIGHT OF FLARES ON THE AERODROME: A NIGHT FIGHTER TAXIES ACROSS TO TAKE OFF. NOTE THE NAVIGATION LIGHTS ON EACH WING-TIP

BACK FROM THE "BEAT": TWO SERGEANT-PILOTS HAVE A MEAL ON THEIR RETURN FROM A PATROL

A year ago we feared the clear moonlight skies when the German night-bombers came in scores. Now it is the German bomber crews who fear the moonlight, because it guides the night fighters of the R.A.F. more easily to intercept them. During the last full moon, night fighters destroyed at least twenty-three enemy bombers over Britain. These pictures were taken at an R.A.F. station during that period

BOMBER PILOTS OF THE R.A.F. ADOPT A NEW SARTORIAL STYLE FOR OPERATIONAL WORK—THE "BATTLE-DRESS" UNIFORM, AS NOW WORN

…t an English Bomber Station, officers and N.C.O.s in "battle-dress" pass a Hampden on their way …o be "briefed" for a raid. Some time ago a number of fighter pilots started to wear this …niform, and now the bombers are following suit—literally! Officers and N.C.O.s wear the same style uniform, with shoulder-straps to denote rank, and "wings" to denote membership of the R.A.F.: otherwise the uniform worn by the flying men is identical with that worn by the Infantry

NEWS ITEMS of the WEEK

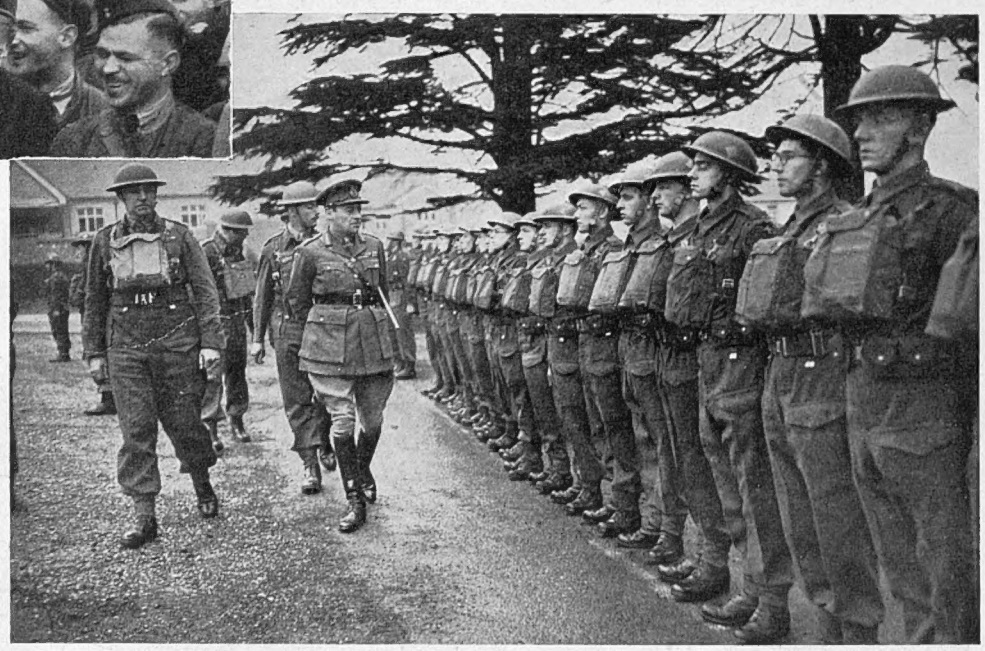
THE KING AND QUEEN VISIT PLYMOUTH : This port and town has been severely bombed by the Germans. During their visit their Majesties visited Naval Establishments, toured the Dockyard and the bombed areas, and inspected troops. Here they are seen greeting an officer of an armed trawler

LORD GORT IN THE SOUTHERN COMMAND : The Inspector-General of Training recently paid a visit to the Southern Command, where he visited various units. Here he is seen talking to a Scottish soldier during his tour

MR. MENZIES VISITS AUSTRALIAN AIRMEN OF THE COASTAL COMMAND : The Australian Prime Minister during his visit to the South-West, inspected a Coastal Command Air Station, where he met members of a squadron of the R.A.A.F. Mr. Menzies must have been exceptionally witty on this occasion—to judge by the features of the two men on the right!

LORD REITH VISITS THE SOUTH COAST : As Minister of Works and Public Buildings, Lord Reith is here seen (hatless, on the left) viewing the bomb damage caused during recent raids on a South Coast town

On left—**THE NEW COLOURED FIELD-SERVICE CAP FOR A.T.S. GIRLS:** Women of the A.T.S. are now allowed to wear the new coloured field-service cap, which may be used for walking-out instead of the customary peaked cap. The new cap is in beech brown, piped with leaf green, and is expected to be very popular : any member of the A.T.S. can now buy one. In the picture the officer wearing the new head-dress is Company-Commandant Prudence Neill



COMMEMORATING THE LAST INVASION OF ENGLAND—IN 1797 : A Regiment of Field Artillery has just commemorated the Last Invasion of England—at Fishguard in 1797. This Regiment, the Pembrokeshire Yeomanry, were given Battle Honours for the event, when 1,200 Frenchmen who were foolhardy enough to embark on a hopeless expedition were forced to surrender. A major-general (shown above) carried out the inspection

Drawing by Montague Dawson

DAWN AFTER THE NIGHT OF DANGER: AN ARMED MERCHANTMAN AT THE HEAD OF HER CONVOY IN THE WIDE ATLANTIC

The night is safely passed, and her valuable charges are one day nearer to port. The ship which has the responsibility of shepherding the convoy is one of our fast converted liners, armed with 6-in. guns. The plan for using such vessels in wartime goes back to 1887, when the Admiralty and the shipowners got together and evolved a scheme which proved triumphantly successful in the last war. It was the moderate-sized armed liners—staying out in the Atlantic for long periods in the worst of conditions—which ultimately starved Germany into submission in 1918

THE AUXILIARY CRUISERS OF BRITAIN. A Note by FRANK BOWEN

A GOOD deal of attention has been drawn to the work of the auxiliary cruisers by the particularly gallant conduct of the P. and O. liner *Rawalpindi* and the Aberdeen-Commonwealth liner *Jervis Bay*, both of which gallantly faced a vastly superior enemy and went down with their colours flying. The Royal Navy has always looked to the Merchant Service as its first reserve of personnel and material; the auxiliary cruisers which are taken from the passenger lines to-day are the direct descendants of the armed merchantmen which the Cinque Ports supplied before there was a regular Navy, and those which went out to fight the Armada.

No auxiliary cruiser can stand up against a regular warship with any chance of success, as the *Rawalpindi* and *Jervis Bay* proved. During the War of 1914-18 the same lesson was taught. The Cunard *Carmania* sunk the German armed cruiser *Cap Trafalgar* before she could sink a single merchantman, but she was very nearly destroyed herself in the action. The Royal Mail *Alcantara* fought the German auxiliary *Greef*, but they were both destroyed, like the Kilkenny cats. When the present war started, therefore, the Admiralty was quite aware of the limitations of the auxiliary cruisers, and has put them to the best use.

It is quite impossible to fit the armed merchantship with any protection such as would be given to the smallest of cruisers. She is, in the Nelsonian expression, "as bare as the paunch of the purser's sow," and she is not only liable to be ripped open by shell-fire, but particularly liable to be set alight. Another very weak point is that the communications between the bridge and the engine-room and gun positions are particularly vulnerable.

It is comparatively easy to fit magazines into the lower holds and to give them the refrigerating machinery and flooding appliances which are necessary for safety. It is, unfortunately, quite another matter to fix up a protected supply system from these magazines to the gun positions: shells and charges have to be whipped up by an adaptation of the ship's peace-time cargo-handling gear, and moved along from the hatches to the guns by hand. This prevents the guns maintaining a rate of fire which is in any way comparable to that of a cruiser.

The guns themselves are also very much inferior to those of a regular man-of-war. Naturally, the auxiliaries do not get the newest pieces, which are always badly needed for the first-line fleet, and in the best of circumstances their guns—the standard armament was eight 6-inchers during the late war—are easily out-ranged by the later marks. This is made worse by the fact that it is impossible to give them up-to-date mountings. A modern cruiser has her 6-inchers mounted in turrets, and they have such a high elevation that they can carry their shells to the very limits of range, and can even be used for anti-aircraft purposes. The auxiliary has to mount her guns on the decks which are normally used for passengers and the working of the ship; these are strengthened to withstand the shock, but the breech of the gun will be against the deck long before it has been given the elevation necessary for extreme range.

Apart from the range, eight 6-inch guns mounted in a modern cruiser will be in two turrets forward and two aft, the inner ones superfiring over the outer, so that all eight guns will bear on the broadside and four right forward or right aft. It is impossible to fit turrets on the keel line of an auxiliary, so that her guns have to be mounted singly against the rails on either side of the ship. Only half the weight of fire can be brought to bear on the broadside, and two guns, at the most, forward and aft. The placing of the anti-aircraft battery presents even more difficulties.

As we have far fewer regular cruisers than we need, it is necessary to fall back on the auxiliaries for innumerable jobs. Outside the more immediate danger areas, they protect convoys and have been doing it very well. Should the attacking vessel prove to be a pocket-battleship, or a 10,000-ton cruiser, the fate of the auxiliary is probably sealed, although the *Jervis Bay* saved the greater part of her convoy by putting up such a gallant fight while it scattered. Against armed merchantmen, such as have been raiding in distant seas, the auxiliary can do magnificent work. Admittedly she is vulnerable, as was proved in the late war, but the raider is equally so, and while the British ship can reckon on facilities for repairs and can go on fighting until she is almost sinking, quite minor damage sustained by a lone-hand raider is a very serious matter.

Drawing by Montague Dawson

NOVEMBER 5, 1940: THE HEROISM OF THE "JERVIS BAY," WHICH EARNED HER COMMANDER A POSTHUMOUS V.C.

The story of the auxiliary cruiser *Jervis Bay* will go down as amongst the most gallant actions in British naval history. Although hopelessly out-gunned by a German battleship of the Graf Spee class, H.M.S. *Jervis Bay* went out at once to engage the enemy. She thus enabled her convoy to scatter, and very few ships were lost. Mr. Dawson, "The Sphere's" naval artist, is at the moment engaged on a large canvas to commemorate the heroism of the Commander and crew of the *Jervis Bay*. This picture is the first draught for his larger work

ON THE BRIDGE OF A BRITISH MINESWEEPER AT WORK IN ONE OF THE SHIPPING LANES

Once regarded as their prey by German airmen, the little ships around Britain are now giving back as good as they receive. Germans "who make brutal attacks on British fishing vessels are being given cause to regret their activities," says an Admiralty communiqué recently issued. And that goes for the minesweepers and other craft generally to-day!

The "LITTLE FELLOWS" VERSUS AIRCRAFT

The Trawlers and Coasters and Drifters, and their Never-Ceasing Campaign Against the German Bombers

Described by FRANK C. BOWEN

THE Admiralty has, since the beginning of this war, constantly had the pleasure of reporting enemy aircraft being shot down by the smaller naval units—not only regular warships but auxiliary trawlers and drifters, sometimes even by little coasting vessels at sea on their lawful trading occasions, with only a Lewis gun lent them in the hope of their being able to keep the enemy at a safe height. With the non-commissioned ships not all the cases have been recorded, for the murder of Captain Fryatt during the late war is remembered, and ships which have successfully defended themselves are not often mentioned by name on account of unjustified reprisals. Even the list of naval successes is not complete, for the Admiralty will not admit a claim unless it is absolutely certain, and there have been many occasions omitted when a victory would have been claimed by the enemy as beyond all doubt.

Considering that a large proportion of the little ships' successes have been against dive-bombing attacks, when the plane's speed is so great that she is difficult to hit from the steadiest gun platform and very much more so from a lively trawler or drifter, it is impossible to speak too highly of the coolness of the men behind the guns.

During the last war, when there was a serious shortage of guns, some doubt was expressed as to the wisdom of sparing anti-aircraft pieces for small craft, even destroyers, although aircraft were very much slower and flew much lower in those days. After a good deal of discussion destroyers were given old 6-pounders, converted from anti-torpedo guns, and 2-pounder pom-poms to keep planes well above the height from which accurate bombing was possible and to deal with the Zeppelin airships which were then used by the German Navy for scouting. The sloops of the Herbaceous Border class were each given a 3-pounder converted to an anti-aircraft gun, like the 6-pounders too old to be really useful, but there were not many guns left for the smaller types. After the war the surviving ships were more generously supplied.

France was left with a very large fleet of "avisos," which is a comprehensive term covering what would be sloops, despatch vessels, escort vessels and patrol ships in the British Navy. They varied very greatly in size and speed, for they had been acquired and built during the war according to the opportunity offered, but after the Armistice all of them which had not hitherto carried anti-aircraft guns were given them. There was a large range of size and type—3·9-in., 14-pounder, 9-pounder, 6-pounder, 3-pounder, 1-pounder and machine-guns—but there were plenty of them, and their men were given a great deal of practice.

When the construction of small craft was recommenced by the British Navy under the 1927 estimates, the Bridgewater class was given two 4-in. double-purpose guns, mounted so that they were available against submarines, surface craft or aircraft, and two machine-guns. The Grimsby class which followed later mounted two 4·7-inchers with an anti-aircraft battery of one 3-in., two 3-pounder and ten machine-guns. Shortly before the war it was realised that the Bridgewater class were too lightly armed, and their battery was changed to six 4-in. double-purpose and twelve small, while the Egret class carried eight 4-in. double-purpose and seven small, the 510-ton Kingfisher class one 4-in. double-purpose and eight small, and the 815-ton minesweepers two 4-in. double-purpose and five small. Motor torpedo-boats were fitted with Lewis machine-guns in quadruple anti-aircraft mountings.

THE "LITTLE FELLOWS" AT WORK: A TRAWLER TAKES A CRACK AT A GERMAN DIVE-BOMBER—AND THE BOMBER WILL DIVE NO MORE!—*Drawing by Montague Dawson*

One of the numerous successful actions already reported since the opening of the present year. Soon the bombers of the *Luftwaffe* will have to look elsewhere for their victims, because the trawler crews are becoming quite expert at their job now

By that time the air menace was fully appreciated and, in addition to obsolete cruisers which cannot be described as small craft, fifteen old destroyers of the "W" and "V" types, built during the late war, were converted into special anti-aircraft escort ships. One of their three boilers was suppressed in order to make room for plenty of ammunition, and their speed was thus reduced from 35 to 25 knots; their torpedo-tubes were taken out and they were re-armed with four 4-in. anti-aircraft and two multiple machine-guns. The special escort vessels of the Hunt class which were laid down under the 1939 estimates, known to the Navy as the "Woolworth" destroyers, have only been officially described in very sketchy terms.

Since the war started the Admiralty has announced that the paddler, *Royal Eagle*, among other "Butterfly Boats" which used to carry excursionists in happier days, has been fitted as an anti-aircraft ship, for she scored a success last year and was given official credit for it. The broad decks of these paddlers, designed to carry the greatest number of passengers, give a fine opportunity of serving high-angle guns, which is always difficult in cramped quarters, and this would seem to compensate for the large target which they offer on account of their beam.

The Germans have used aircraft against merchant ships in the North Sea from the beginning of the war, in the Atlantic since they have had possession of the Breton coast, and since the early days of this year dive-bombing attacks have been continuous. The escort vessels, patrol boats, trawlers and drifters which are mainly responsible for the safety of shipping in narrow waters have thus been kept busy.

To mention the latest success: at the end of January H.M. Trawler *Galvani* was attacked by a Junkers 88 and brought her down. Next day the flotilla

THE VESSELS WHICH STILL PURSUE THEIR EVERYDAY TASKS: Vessels of the Trawler Fleet, many of whom have been armed to counter the attacks of enemy aircraft, about to set out on a fishing expedition in waters which are infested by the enemy. These trawlers are playing a considerable, and hazardous, role in feeding British citizens

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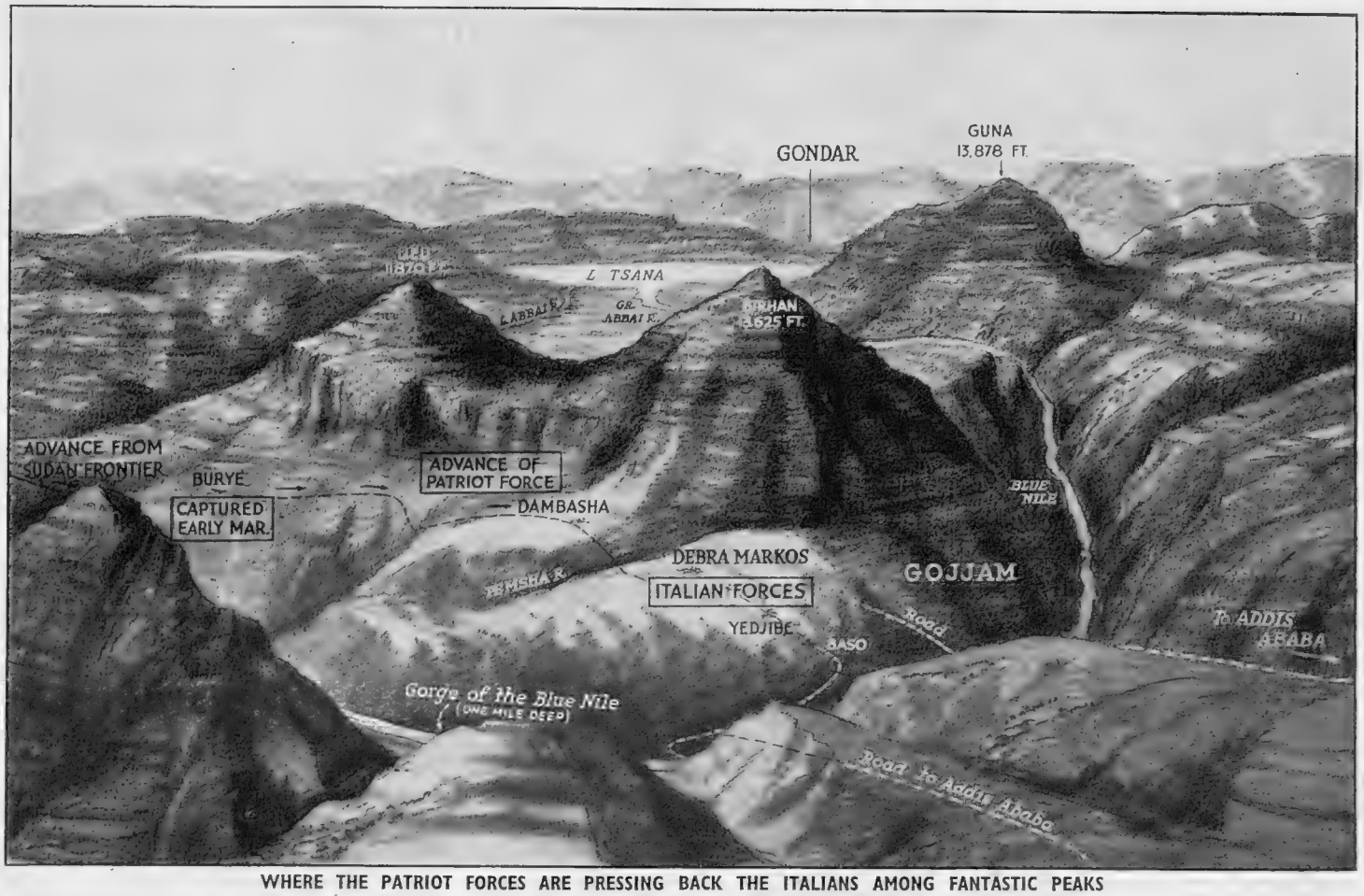
PROGRESS of THE CAMPAIGNS AGAINST ITALY'S ILL-KNIT EMPIRE

THE remarkable speed of the attacks in East Africa upon the stranded Italian forces, fighting without hope of reinforcement, has impressed all the military critics. There are at least six fronts pressing in upon the garrison of Italian Ethiopia, and during the middle period of the present month it was possible to record steady, and in some cases exceptional, progress. The latest addition was the advance from British Somaliland, where the capital, Berbera, fell to combined land and sea forces. The garrison was aware that a big development was taking place in their rear—fears which were fully justified when, on March 19, the fall of Jijiga was announced. This position, now in Imperial Force hands, on the high ground in the same latitude as Harar, obviously threatened all the Italian garrisons in British Somaliland. Another force was pressing up the Royal Road towards the Great Central Abyssinian plateau, on which the main forces under the Duke of Aosta are probably congregated. Addis Ababa, the former capital of Haile Selassie, lies 6,000 ft. above sea-level, but is not defended by any circle of heights.

On the west, other forces were pushing on to the high ground through rather difficult country. One, by way of Burye, had been traversing fantastic hill slopes overlooking deep river gorges. This section of Abyssinia, where the Blue Nile flows westwards to the Sudan, has been eroded into what might be termed lunar landscapes. The Debra Markos road to the capital pitches and climbs in a fashion which has to be seen to be believed.



WHERE THE PATRIOT FORCES ARE PRESSING BACK THE ITALIANS AMONG FANTASTIC PEAKS

In the district of Burye and Debra Markos the opposing forces are operating in a country almost terrifying in its medley of strangely carved mountain peaks and yawning valleys. Debra Markos, upon which the patriot forces were advancing, lies above the gorge of the Blue Nile, picturesquely described as being a mile deep. The place guards two roads to the capital. Above the Blue Nile tower some peaks which exceed 13,000 ft. in height. The River Abbai, flowing from Lake Tsana, becomes the Blue Nile

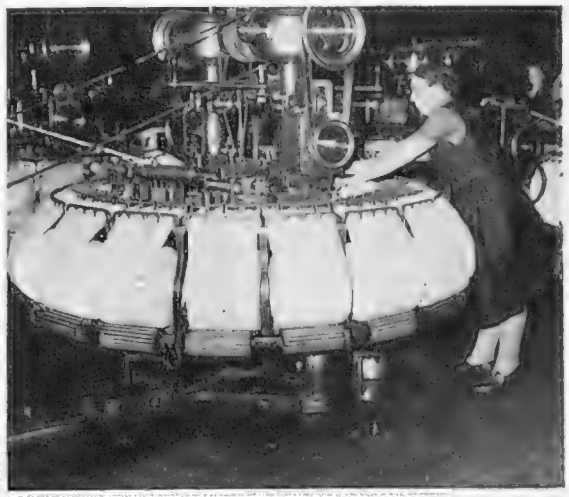
FLYING OVER THE CENTRAL ABYSSINIAN PLATEAU IN THE GOJJAM DISTRICT : The mountains soar upwards to over 10,000 ft., assuming the most bizarre outlines owing to the erratic stratification of the rocks. A sparse vegetation attempts to clothe the raw gullies bitten into the mountain slopes, but often with little avail

***On right*—IMPERIAL FORCES ARE PRESSING FORWARDS ON SIX DIFFERENT FRONTS :** Remarkable speed over long distances characterised the movements in the south. Towards the north, owing to heavy concentration of enemy troops in particularly difficult country, the progress was slower. Jijiga fell on March 19 and the way appeared open for an advance upon Harar. Berbera had been regained a few days earlier. The Imperial Forces continued to creep nearer to the Keren defences as each day passed

SHE OPERATES A "SMITHY ON WHEELS": Although only twenty years of age, Mrs. Anne Hughes has been married for three years. With her husband, Alfred, she takes her miniature anvil round the villages of Surrey, towing it behind their tandem-cycle for miles around Woking. Then, with shoes already fashioned at the home forge, they shoe the horses on the spot, thus saving the horses' legs and the farmers hours of travelling

NEWLY-JOINED RECRUITS TO THE W.A.A.F.: They have just been issued with their new uniforms and equipment, and are leaving the stores for their new quarters in camp. This picture comes from a West Country station of the Women's Auxiliary Air Force, where large numbers of women are already serving with the Forces

THE WOMEN WHO HELP TO BUILD THE ARMY'S TANKS: An officer of the Royal Armoured Corps just back from Libya sees for himself the work of women in a Ministry of Supply factory in the Midlands. This factory builds Cruiser Tanks, the production of which entails 6,200 detail parts, requiring some 50,000 machining and assembling operations. Later, the girls employed here were given a first-hand account of the Tank operations in the Desert



WOOL GOODS FOR EXPORT MEAN MUCH-NEEDED FOREIGN CURRENCY FOR BRITAIN: A woman worker in a worsted-spinning and weaving mill in the Industrial North. This region produces the world's finest cloths for export, and the products go all over the world—a very important branch of our wartime effort as it materially helps in our vital Export trade, and brings foreign currency in return

A LORRY CONVOY DRIVER OF THE A.T.S.: These specialist drivers do a fine job of work in all weathers. Their principal task is the "ferrying"—in convoy—of new lorries from the factories to units dispersed throughout the country. During the severe wintry conditions of the past few months their work went on with but few interruptions

SOME OF THE WOMEN WHO HAVE ALREADY RESPONDED TO THE CALL

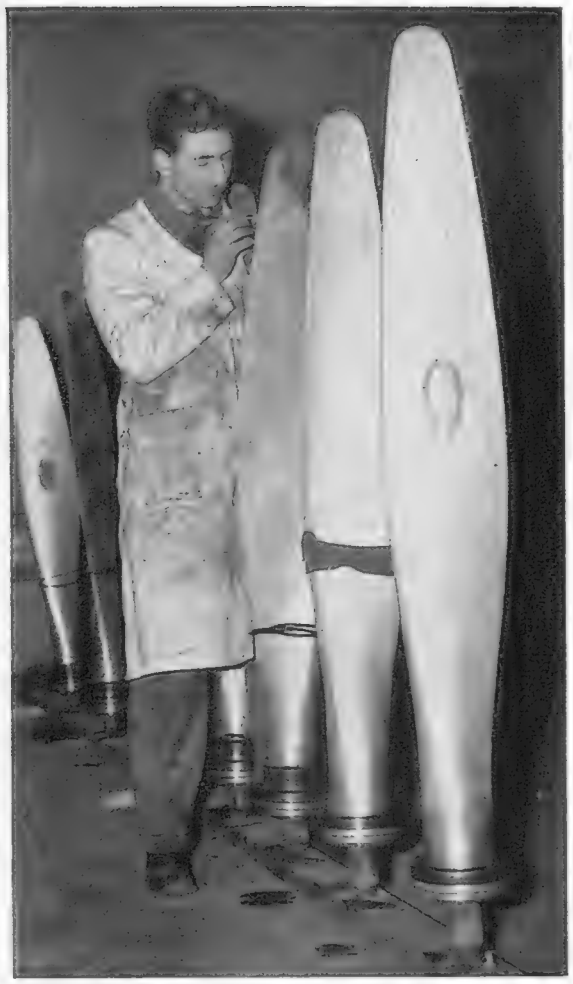
PHYSICAL TRAINING FOR GIRLS OF THE A.T.S.: It is not all work for the women of the Auxiliary Training Services: included in the schedule is a physical training course. This picture comes from an A.T.S. training establishment in the South of England

A REST HOME FOR WOMEN WORKERS IN THE SERVICES: An Elizabethan mansion in Oxfordshire is one of the buildings taken over by the Authorities as a hospital for women workers in the various Services. Some of the girls seen in this picture have been injured during the course of their duties; others are recuperating from the effects of bombing attacks

GIRLS IN THE HOME GUARD: The first company in the country to form an Independent Women's Nursing Section is the Headquarters of the N.A.A.F.I.—the organisation which caters to the diverse needs of the Fighting Services. The new unit was started at the suggestion of the O.C., Captain Thomas Nicholas: it is composed of twenty-five girls whose ages range from seventeen to twenty-five. Typists and clerks by day, the girls devote two evenings a week to first-aid lectures, and they are regular attendants at all parades. They have been supplied with very smart uniforms and capes which are worn on these special occasions, as seen above

DIFFERENT TYPES OF AIRSCREWS—ALL OF METAL CONSTRUCTION—UNDERGOING REPAIR

These are not complete airscrews, but only the blades. After repair they will be replaced in the hub, ready for further service. It is interesting to note the contrast they present—in shape, length, profile and design of tip. Although these blades are all of metal, many wooden propellers are still in use in the R.A.F. They are cheaper, the material for their manufacture is more easily obtainable, they are easy to repair if a shot goes through them—but, of course, in a forced landing the blades usually snap off. The wooden propeller is comparatively easy to make, but they are apt to suffer from abrasion by the rain and air. For the variable-pitch and feathering airscrews discussed in the accompanying article, however, metal is usually employed. Incidentally, when whirling at full revs. the tips of the blades travel at terrific velocities; almost approaching the speed of sound. A good deal of the noise one hears from an aeroplane in flight comes from the threshing of the propeller as it cuts through the air



KEEPING PROPELLER BLADES IN PERFECT CONDITION: An essential operation in the proper servicing of aircraft. "When an airscrew is turning at its maximum revolutions the load on the root of each blade is equivalent to the weight of half-a-dozen London buses suspended from the end. And yet the blade must be free to rotate sweetly and easily!"

NEW AIRSCREWS for OUR NEW AIRCRAFT

Each Big Advance in Aircraft Design has Meant a Corresponding Advance in the Design of Propellers, or more Properly Airscrews. This most Fascinating Aspect of Modern Engineering Accomplishment is here Fully Discussed and Illustrated

A Special "Sphere" Section

IN the whole sphere of aeronautical science the most abstruse and complicated theory of all is to be found in the realm of airscrew design. And yet in its basic principles the theory of the airscrew is simple enough, for it is nothing more than a gigantic edition of the common or garden wood-screw which thrusts itself forward as it turns. It is acting in a thin and elusive medium, yet the modern airscrew which may be up to about 17 ft. in diameter absorbs about 2,000 horse-power quite happily and converts it into thrust.

The first airscrews—the term propeller is properly used only for a pusher type—were extremely crudely built, fashioned only from carved boards set at an angle to each other on rods keyed to the airscrew shaft. The Wright Brothers, who were always more scientifically inclined than the other very early pioneers, investigated airscrew theory and evolved airscrews which were far in advance of their time. Many of the early efforts resembled paddles set on shafts rather than shaped blades.

All the early airscrews were built from wood, at first carved from the solid baulk, usually mahogany or walnut, and later built up in laminations, glued together. During the war from 1914 to 1918 vast quantities of airscrews were made, most of them by furniture builders.

The metal airscrew did not appear until after the war. The chief drawback to the early wooden airscrews was that the edges became frayed by rain and had to be replaced at frequent intervals. Thus the metal blade was put forward as a cure for this trouble. Two kinds were built, the forged duralumin blade twisted to the required pitch and the hollow metal blade welded together. This latter type was not successful at first, and was abandoned in favour of the forged metal blade.

All these airscrews were of the fixed-pitch type in which the blades were set at one particular angle in construction and never varied. This was obviously inefficient, because the angle of blade which would be most efficient at low speeds, and particularly to give the initial thrust to get the aeroplane off the ground, would not be sufficient at high speed and at great heights in more rarefied air. On comparatively slow aeroplanes, in which the ratio between top speed and take-off speed was not great, this fact did not matter much, and the variable-pitch airscrew was not worth the weight, complication and expense it entailed.

Matters came to a head in the Schneider Trophy Air Races when speeds began to get really high. These seaplanes had great trouble in getting off the water at 100 m.p.h. when their airscrews were designed to absorb more than 1,000 h.p. at a speed of more than 300 m.p.h. By 1931 things had come to such a state that the seaplanes which competed in the race took off with half a ton more fuel in one float than the other to compensate the swing in take-off. Some dozen or more varieties of metal airscrew were tried on these Supermarine seaplanes in an effort to hit on the most efficient type.

A few years before this the first variable-pitch airscrew had been flown. Dr. Hele-Shaw, working with the Gloster Aircraft Company, Ltd., produced a variable-pitch airscrew which was flown on a Gloster Gamecock single-seat fighter with excellent results. However, the advantages did not justify production at that time.

The Schneider Trophy contest and the advance in speeds early in the 1930s gave a real fillip to the design of variable-pitch airscrews. As a result the Hamilton Standard Division of United Aircraft in America went into production with the first type to be produced commercially on a large scale. This Hamilton airscrew was operated hydraulically, and is still a standard type in service all over the world.

Gradually the variable-pitch airscrew was adopted on both commercial and military aeroplanes, at first in America and then all over the world. Its adoption coincided with a great advance in aeronautics, generally marked by the adoption of the low-wing monoplane, the retractable undercarriage and the landing flaps. Aeroplanes became more complex to fly, but of greatly increased performance.

Two further advances marked the progress of design. They are the constant-speed airscrew and the fully feathering type. Before we go on to discuss these developments and the advantages they afford, let us look at the reason why an airscrew works as it does.

The blades of an airscrew are inclined at an angle to the air, so that as the motor turns the shaft so the blades bite on the air at a definite angle, styled the "pitch." A blade of an airscrew may be considered exactly as the wing of an aeroplane. It is curved in the same manner to afford lift, and if it is inclined at too great an angle to the airflow the blade will "stall" like a wing and lose most of its lift or thrust. Thus when the angle of the blade is inclined steeply towards the airflow in a high-speed aeroplane so that it presents the correct "angle of attack" when cruising, it will be inclined far too much at low speeds and consequently will be stalled at take-off. For that reason controllable-pitch airscrews are designed which can be turned to "fine pitch" for take-off and to "coarse pitch" for high-speed flying.

Early controllable-pitch airscrews were of the two-pitch variety, with one angle for take-off and another for cruising. As speeds became still greater, this was not found to be a complete solution and so the constant-speed airscrew was designed.

In this type of airscrew the angle of the blades can be varied from a minimum for take-off

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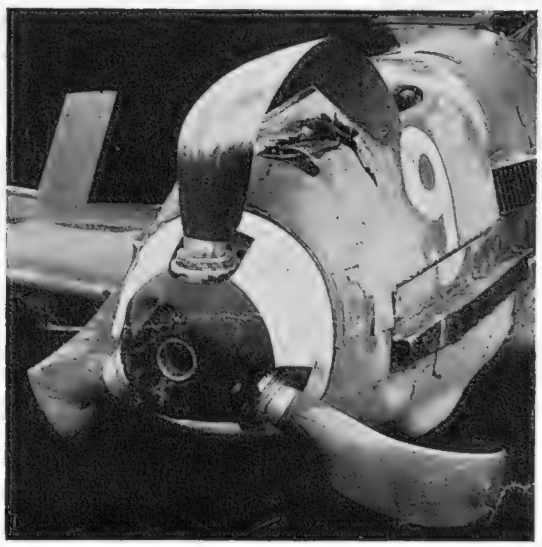


WHAT HAPPENS TO THE AIRSCREW IN THE EVENT OF A CRASH LANDING: These two pictures were taken recently. They show the noses of two German aircraft brought down during combat near London. In both cases the propellers have twisted but not broken: this is due to the comparatively soft metal of which the blades are composed

NEW AIRSCREWS for OUR NEW AIRCRAFT

(Continued from previous page)

progressively to a maximum which is sufficient for speeds greatly in excess of the normal top speed of the machine. A governor is incorporated in the mechanism which automatically varies the pitch of the blades as the speed of rotation of the aero-motor rises or falls.

Thus if the aeroplane is in a steep climb and the motor begins to labour, like that of a car on a hill, the governor reduces the pitch of the blades so that they bite less acutely at the air and the revolutions of the motor are maintained at its previous level. Similarly in a steep dive the airscrew tends to turn the motor faster than normal, like a car running down a hill. The governor turns the blades to a coarser pitch and so reduces the speed of the motor to its previous rate.

All this relieves the pilot of much strain and attention, particularly valuable in a fight. He has no worries with his engine. He knows that if he opens the throttle to a certain extent to a stated number of revolutions the airscrew will hold those revolutions constant whether the aeroplane be in a vertical dive or zooming vertically in a climb.

The feathering airscrew is one of the greatest contributions towards safety which has been devised for flying in recent years. Its use is on a multi-motor machine when one motor has been put out of action. By feathering the airscrew the motor is stopped from turning and the minimum resistance is offered to the air.

When an airscrew is feathered the blades are turned edge-on to the direction of motion of the aeroplane. Thus they do not have a tendency to windmill round as they have in normal pitch. This "windmilling" not only sets up a great deal of resistance, but also churns up the moving parts of a damaged motor and may cause serious vibrations in an aeroplane. On occasion the ability to feather an airscrew may mean all the difference between a damaged bomber returning to its base or falling in enemy territory. For instance, if the airscrew cannot be feathered the undamaged motor may have to be run at maximum power the whole time to maintain height, and it may overheat and seize. Petrol consumption is greatly increased and the aeroplane may even become uncontrollable.

The three-blade airscrew is now used by most aeroplanes, both civil and military. It has superseded the two-blade type because of the need to absorb more power without increasing the diameter. Diameter must be kept to a minimum for many reasons, chiefly because if the diameter becomes too big the undercarriage must be raised to an unnecessary height, the motors must be set farther out in the wings, and the speed of the tips becomes so great that great drag is set up and much noise caused. Blade area is used to absorb power, so that the next step may be a return to the four-blade airscrew. In fact, the three-blade might never have appeared but for the difficulty of building a compact hub which would accommodate the mechanism to turn the pitch of four blades at once. In fact, this hub design is one of the biggest headaches for airscrew designers. Complex mechanism to turn the blades must be compressed into the minimum space and made to withstand very heavy loads. When each blade is turning at its maximum revolutions the load on the root of each blade is equivalent to the weight of half-a-dozen London buses suspended from the end. And yet the blade must be free to rotate sweetly and easily.

Naturally the weight of the blades has a great influence on this factor. Modern airscrews are being produced with both wooden and metal blades. Of the two the wooden blade appears to be coming into its own again.

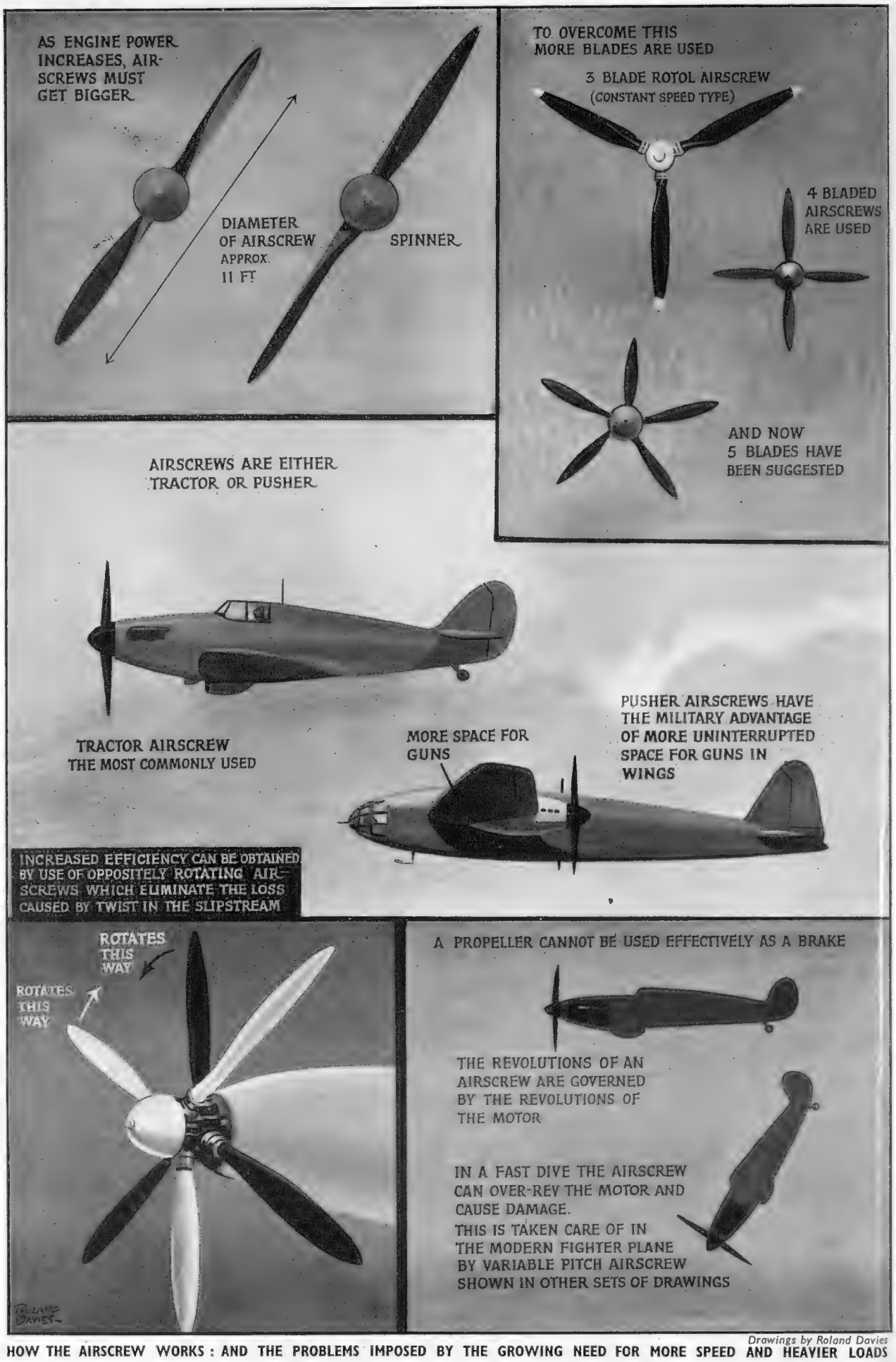
The reason for this is because new means have been found to toughen up the wood to withstand the abrasive action of rain and hail, even at modern speeds. Laminations of compressed and impregnated wood are used for the construction of modern wooden blades. The wood has a plastic resin forced into its cells, and the amount of impregnation is varied throughout the length so that a very heavy and dense root tapers gradually out to a light tip. The advantage is that the root can be screwed into an adaptor which secures the blade in the hub and makes possible the variation in the pitch.

The construction of airscrews to-day is precision engineering in one of its more advanced forms. The mechanism of the hub must be made to the finest limits. The blades themselves are works of art and are balanced to the minutest degree, even to the extent of the weight of a coat of paint.

What of the future in airscrew design? There is plenty of scope for the aeronautical engineer to make further advances. More and more power has to be absorbed as aero engines grow in size; higher speeds must be catered for. Take-off with heavy loads must be made possible. One solution is the "contra-prop." This is really two airscrews rotating one behind the other in opposite directions, both turning about the same centres. By this means six blades can be made to do the work where three were severely taxed before, and the diameter can be cut down.

At the opposite end of the scale is the single-blade airscrew evolved to provide automatic variation of pitch for light aeroplanes. In the single-blader the "sawn-off" blade is replaced by a balance weight. As the thrust increases so the blade is allowed to swing forward on an inclined hinge as the pitch is altered.

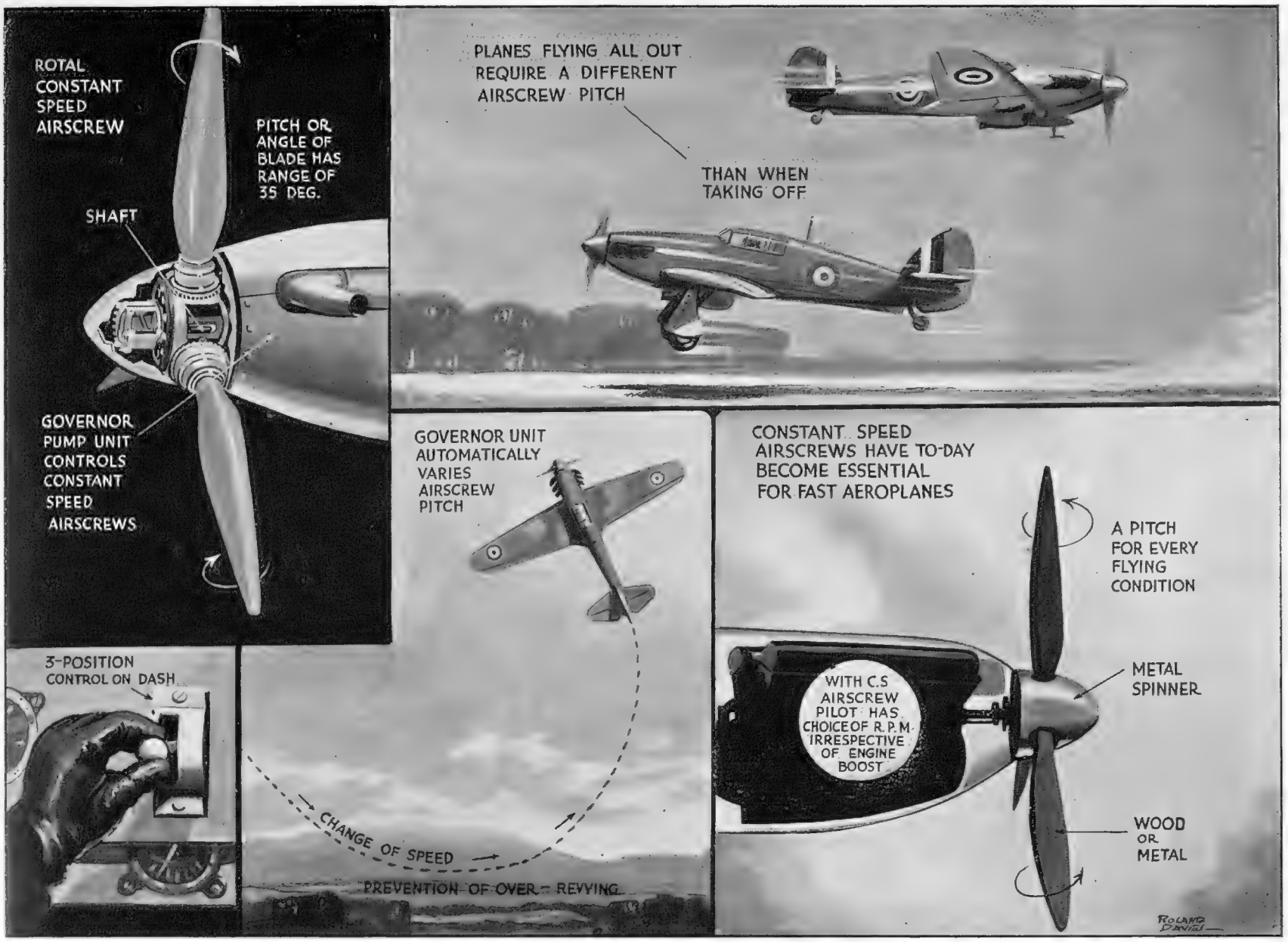
As aeroplanes are designed to fly faster and fly higher, so the days of the airscrew may become limited. At very high speed at very great heights even the most variable of variable-pitch airscrews cannot be made efficient. For one thing the speed



Drawings by Roland Davies

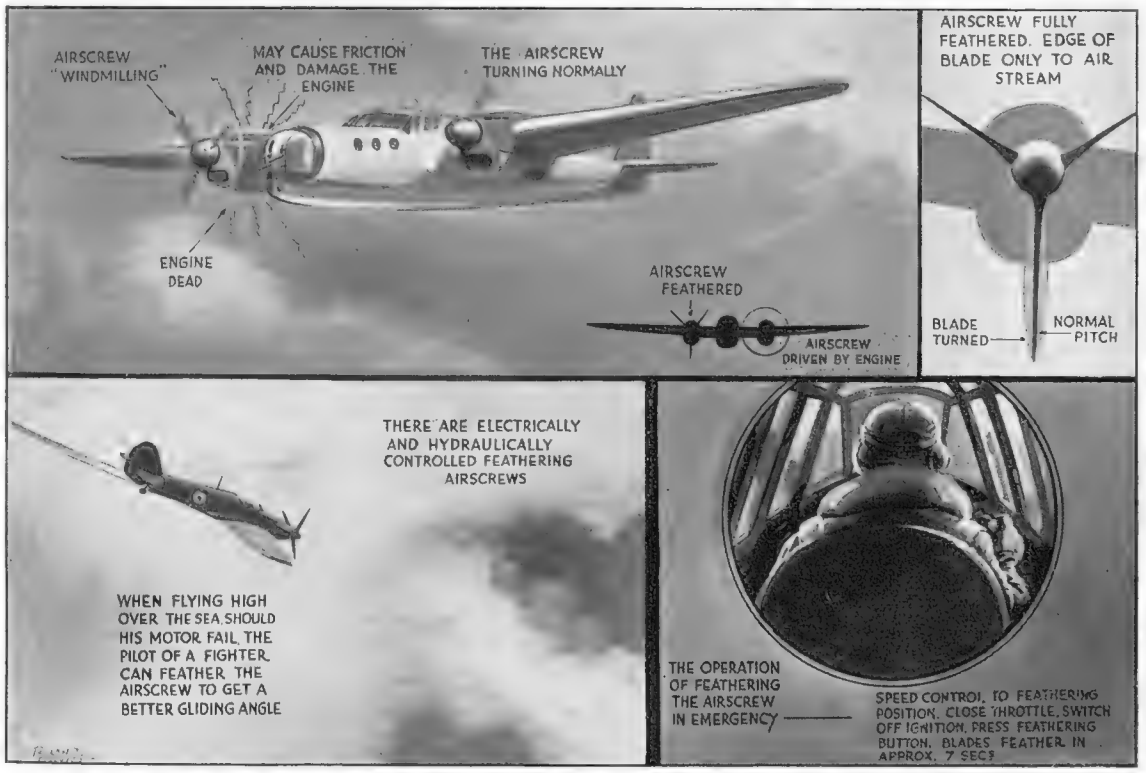
HOW THE AIRSCREW WORKS: AND THE PROBLEMS IMPOSED BY THE GROWING NEED FOR MORE SPEED AND HEAVIER LOADS

With the increasing speeds demanded of modern fighting and bombing aircraft, the power given out by modern engines is being increased every day: to transform this into speed, the airscrews must become bigger and bigger. But beyond a certain size an airscrew cannot be increased in length: therefore more blades must be employed. Three-blade types are now common; soon we will have four-bladed airscrews, and even five blades. Airscrews are divided into two types—tractor (mounted in front of the engine), and pusher (mounted behind): the tractor is the most commonly used, but the pusher has the advantage in actual warfare of allowing more uninterrupted space for the mounting of guns, observation, etc. An interesting modern development is the double airscrew, one set of blades of which rotate in a clockwise direction, the other anti-clockwise; this arrangement obviates any losses in forward thrust caused by slipstream. Unlike the wheels of a motor-car, which can slow down the engine, a propeller cannot be used as a brake: on the contrary, in a dive—unless the propeller is of the variable-pitch variety, the airscrew can cause serious over-revving of the engine



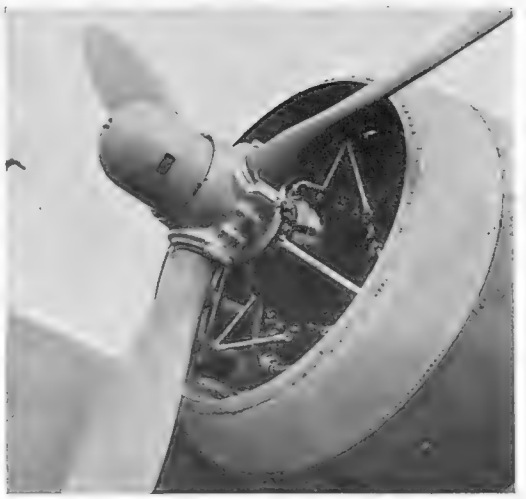
THE CONSTANT-SPEED AND VARIABLE-PITCH PROPELLERS HAVE GREATLY EASED THE CONFLICTING PROBLEMS BROUGHT ABOUT BY MODERN FLYING CONDITIONS—*Drawing by Roland Davies*

When taking off from the aerodrome the pilot has to get his heavily-laden machine off the ground as quickly as possible and then has to gain speed and climb as rapidly as possible. When at his cruising height the propeller must convert engine-power into speed. Yet, at the same time, the engine must not be over-revved in a dive, nor stalled in a climb. The answer is the variable-pitch airscrew : by this means the pitch of the blades is automatically controlled by a governor pump unit, which is set by the pilot to govern the engine revolutions at any predetermined speed. This governor unit automatically varies the pitch of the airscrew as the forward speed of the aircraft changes, so that the engine speed remains the same whether the plane is being taken off, dived or climbed. A further aspect of this same problem is given in the drawing below : that of the "feathered" propeller. Inset in the bottom left of the *above* drawing is seen the mechanism on the dashboard which operates this feathering device on the German Messerschmitt 109



"FEATHERING" THE AIRSCREW ON A TWIN-MOTOR AIRCRAFT IN AN EMERGENCY—*Drawing by Roland Davies*

When one of the motors of a multi-engined aircraft fails, unless immediate action is taken great damage can be caused to the motor. To obviate this the "feathering" airscrew has been developed. By this means the blades are turned thin-side on to the air : consequently the blades cease to rotate, or "windmill," and thus the damaged motor does not become wrecked, as it would do if it were still churned around by the propeller. By ceasing to present a surface to the airstream, too, control of the aircraft is not unduly affected, and a longer glide is permitted to the pilot so that his chance of a successful landing is so much greater

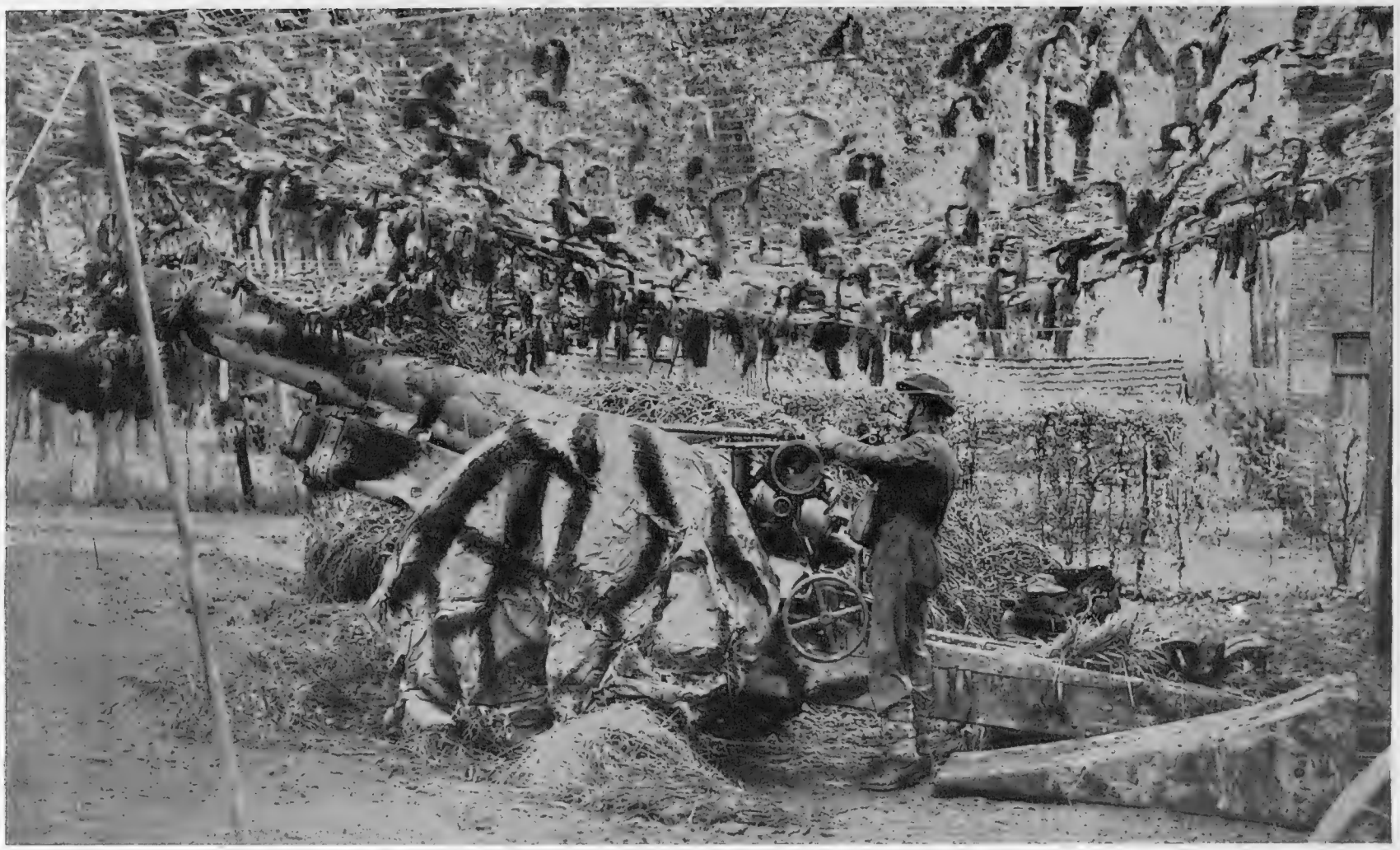


THIS IS A DE HAVILLAND-HAMILTON HYDROMATIC THREE-BLADE AIRSCREW, which is full-feathering ; it is installed on a Bristol Perseus XVI air-cooled engine

MR. L. B. GREENSTED (LEFT), CHIEF TEST PILOT OF ROTOL AIRSCREWS, and Mr. Hall (Assistant Test Pilot) in front of a Whitley Bomber ; the *wooden* airscrew is in the fully-feathered position

of the tips of the blades approaches the speed of sound and immense drag is created. At great heights much more area is needed to the blades to absorb the power in the rarefied air. As yet, nobody has designed an airscrew of variable diameter to meet this problem.

Nevertheless, airscrews will continue to serve their purpose for many years to come, to supply designers with headaches and the ground engineers with one more piece of complicated mechanism to keep in flying trim.



A FINE EXAMPLE OF THE MODERN CAMOUFLAGE ARTIST'S WORK: NOT ONLY HAS THIS GUN POSITION BEEN CONCEALED FROM ABOVE (SO THAT ITS DETECTION BY AIRCRAFT IS DIFFICULT), BUT IT HAS ALSO BEEN CONCEALED FROM ENEMY TROOPS OPERATING ON THE GROUND

Camouflage is no longer the art of painting "pretty pictures" all over the landscape. To-day it is not only necessary to deceive the enemy on land, but also in the air. The gun position illustrated here is an example of how this double task is achieved. Above the gun strips of netting have been hung; these tone in with the foliage of the surrounding countryside. Laterally, canvas has been draped over the wheels so that from the ground-level it is difficult to discover a break in the landscape which would reveal the gun position. Other devices employed would remove traces of the paths from the gunners' quarters to their action stations, so that aircraft could not follow these tell-tale markings

INVISIBLE MEN in MODERN WARFARE

How the Army has Revived, and Improved, the Neglected Art of Camouflage. By DONALD COWIE

THE difficulty about camouflage is that, superficially, anyone can apply it; yet for its effective use under modern conditions much scientific study is required. Thus—it cannot be denied—our Army was not successful in this art until recently, and hard experience had forced the authorities to make a change. Everyone appreciates the elementary principles of the art, as derived from animals, and practised by Robin Hood's men in Lincoln green; the Americans in the War of Independence, who shocked and completely diddled our red coats with their buff and olive suitings; even our own lads in khaki since the Boer War.

But military aviation has so complicated the problems of camouflage that a little knowledge of this art is now a positively fatal thing. Thus, on the outbreak of the present conflict some of the amateurish if well-meaning efforts of our forces to conceal themselves and their tools rightly evoked a howl of protest from scientists.

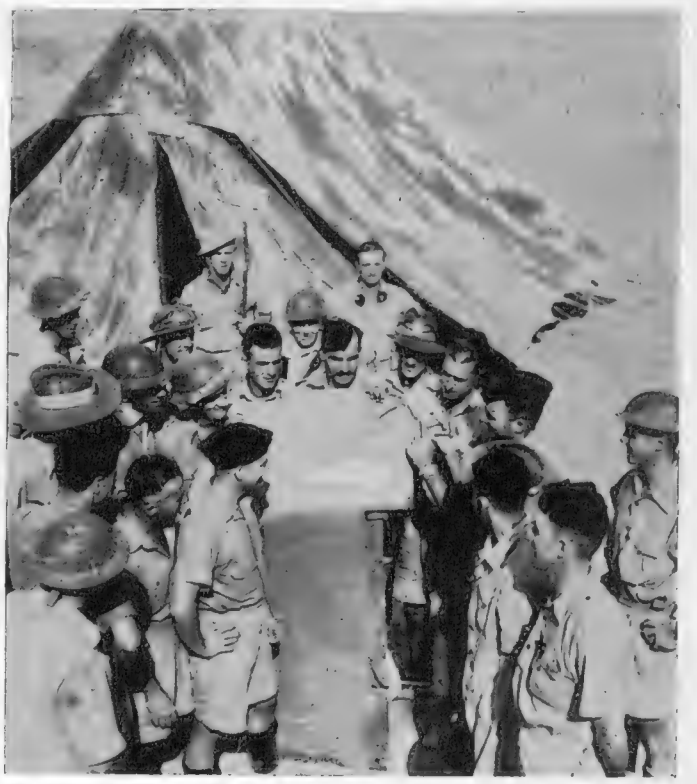
To conceal a hut or vehicle they employed an otherwise talented artist to paint a futurist picture on it in many pretty colours—entirely forgetting that from the air most colours, and particularly pretty shades, tend to merge into each other. But fortunately the Army learnt several lessons all at once last year, and they had the courage almost completely to reverse their camouflage policy as a result.

To-day nets are still used over guns. Towards the edges, however, the netting is deliberately stripped of the familiar pieces of cloth, branches, and so on. Therefore, no defined outline of the object beneath is presented to the aerial photographer, and the shadow cast is negligible, blending with the colour of the net and the surroundings. Similarly, the gun-barrels and wheels can be painted dark above and white below, with sides stippled so that the two colours merge in.

The whole point is that regularity of contour must be concealed. There is all the world of difference between camouflage of objects to hide them from the photographer above and the enemy below. It has been realised at last that the two requirements must be met in diametrically opposite ways. To conceal the sniper a "coat of many colours" or a spotted net can be used. But if an Army tent or Nissen hut is to be made invisible from the air broad strokes must (metaphorically) be used. Attention must be paid to the interplay of light and shade in the vicinity so that the camera, looking down, sees only a confused intermixture of grey and dark which *might* be an extension of that coppice, which might even be a herd of cows grazing in the shadow of a hedge.

Undoubtedly the gunners continue to have the most difficult problems to solve. The Germans

AN ENCAMPMENT ON THE WEST COAST, THE TENTS OF WHICH HAVE BEEN PAINTED TO TONE IN WITH THE LANDSCAPE TO BAFFLE THE CAMERAS OF ENEMY AIRCRAFT



MERGING INTO THE DESERT: A big marquee occupied by the Royal Australian Air Force during the advance through the Western Desert. This marquee represents a very successful attempt in camouflage

CAMOUFLAGING THE AIRCRAFT

DRAB camouflage has replaced the bright silver paint of earlier days on all the world's aeroplanes. The familiar phrase, "Enemy aeroplanes were destroyed on the ground," is responsible for the change. Each aeroplane is painted now so that its colour tones in with the background and is not so likely to be seen from the air.

Each nation has adopted its own camouflage scheme. For instance, British machines are painted in green and brown "shadow shading."

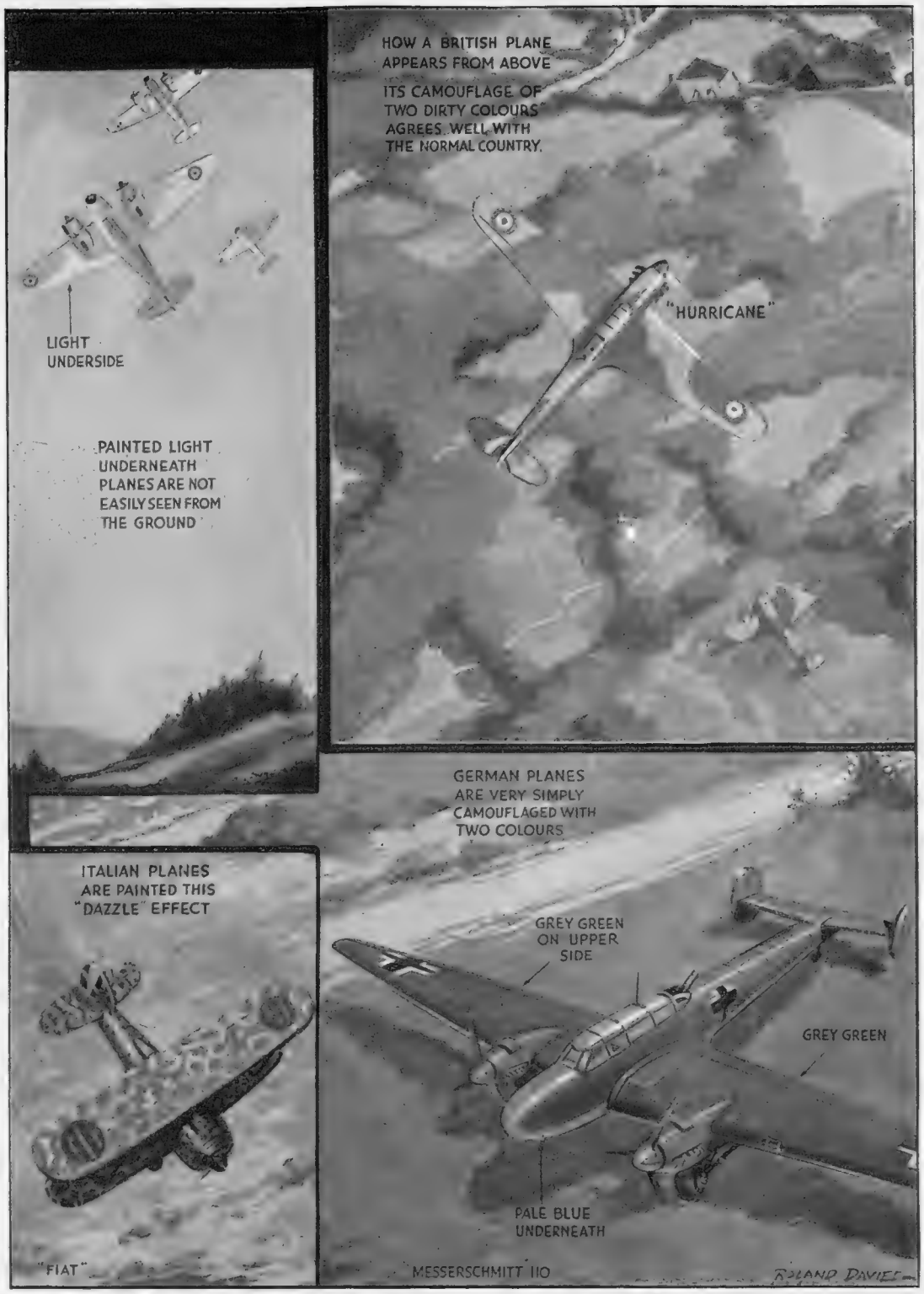
The German camouflage has been modified since the war began. Originally it was in a series of jagged lines of brown and green. This was found too lengthy a job to apply, and now all German machines are dull olive green on top except for the night-flyers, which are black.

The Italians have a third system—mottled green and brown all over. This is a direct reversal of the previous Italian policy brought about by contact with real air power. In the Abyssinian campaign, when there was no air opposition, the aeroplanes of the *Regia Aeronautica* were painted with a series of bright yellow stripes on the upper surfaces so that they would show up well on the ground. The reason for this was that they could easily be discovered if forced to land in inhospitable country where the natives were far from "friendly."

The aeroplanes of most countries are now painted some light blue or green colour underneath for added concealment when flying at a great height. Whether this is effective seems doubtful, as most machines show up dark against the background when seen from underneath.

Although the Germans claim an "invisible" bomber, camouflage has got a long way to go before it can produce this ideal result.

Below—**A "DAZZLE"-PAINTED ITALIAN PLANE BROUGHT DOWN OVER SUFFOLK** *(See also drawing on right)*



METHODS OF CONCEALMENT ADOPTED BY BRITISH, GERMAN AND ITALIAN AIRCRAFT—FOR DISGUISE ON THE GROUND, AND TO CONFUSE THE ANTI-AIRCRAFT GUNNERS—*Drawings by Roland Davies*

demonstrated during the Battle of France how aircraft could be employed to destroy batteries. Therefore camouflage officers with the Royal Regiment have been paying attention to hitherto overlooked things. Gun crews always tread down well-defined paths to their emplacements. These are now made to intermingle cunningly with artificial paths, even to pass right over the gun itself. The unavoidable "blast marks" caused by the weapons must be similarly treated, perhaps covered like the guns, or deliberately extended to appear from the air like another path or road.

The Royal Armoured Corps presents yet another set of problems. Tanks can be particularly conspicuous from both ground and air, and it is important that they be shielded as much as possible from dive-bombers, whose missiles can often pierce the vulnerable tops of the lighter kind. Sometimes, however, it is hardly practicable to encumber fighting vehicles with nets and other exterior attachments. Perhaps the best method is to paint the top a flat grey or near-black, which, blending with the shadow of the tank, gives a misleading idea of its shape and purpose. But grey would hardly blend with the desert sands.

This is another difficulty in the thorny path of our Army camouflage experts. Future campaigns have such a wide choice of terrain that it would be dangerous to adopt any standardised colour or method. Very different methods would be required, for instance, to ensure the invisibility of land forces in, say, Norway and North Africa. So the system must be a flexible one.

First, there is the principle of blending with the background. But this must be modified to avoid aerial detection, and the second principle of shadow-avoidance emerges. Thirdly, attention must be paid to details not directly connected with the object to be camouflaged, such as the direction of paths and signs of human occupation. Fourthly, atmospheric and geographical factors must be taken into account. For example, the north side of a building being the darker side in the northern hemisphere, it must be painted the lighter colour—and *vice-versa* in the southern hemisphere.

The Army had already taken up the problem of concealing soldiers themselves before this war broke out, witness the adoption of battle-dress and painted helmets, the elimination of bright buttons and unpainted metal surfaces. But a lot still remains to be done in this direction.

Above—**A BIG GUN IN BRITAIN CONCEALED FROM AERIAL OBSERVATION**

On right—**AN AIRCRAFTMAN REPAIRING STRIPS OF NETTING EMPLOYED BY THE R.A.F. FOR CAMOUFLAGE PURPOSES**

SYDNEY : Capital of New South Wales, chief fortified naval station of the Commonwealth, and the shipping centre for the South Pacific. This is a view of the Circular Quay

HOBART : Capital and second oldest city of Tasmania. Separated from Australia, it, too, is doing its share in the Antipodean war effort

MELBOURNE : Capital of Victoria, on the banks of the Yarra River. A view of Swanson Street, in the heart of the city

AUSTRALIA'S MIGHTY WAR EFFORT

The Wonderful Work which the Great Commonwealth is Carrying Out as Her Contribution to the Empire's Effort

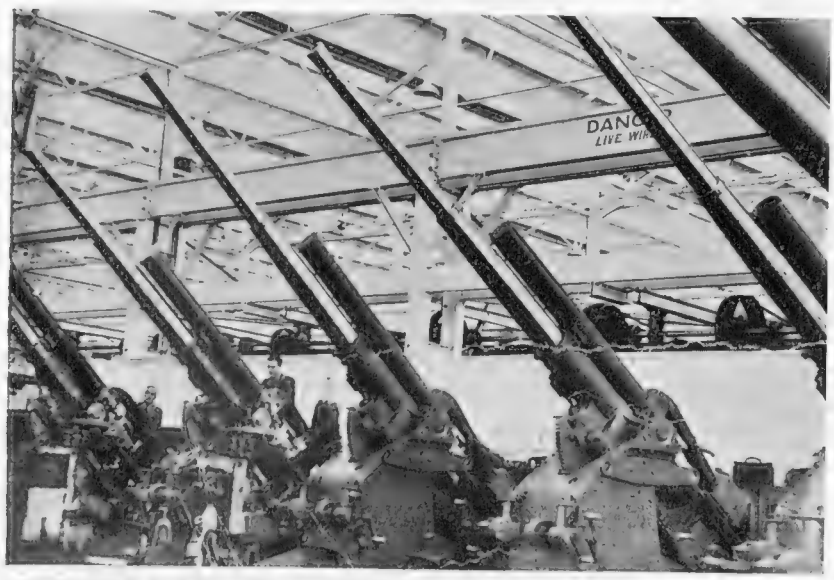
"WE are in this most holy war with you; everything that we have of man-power or treasure or skill or determination is pledged to work and fight for you and with you until victory is attained." This assurance was broadcast by Mr. Menzies, the Prime Minister of Australia, a few weeks ago, on his arrival in England. Those who have seen the great effort put forth by Australia ever since the beginning of the war can testify that the Prime Minister was not indulging in any mere expression of sentiment. The results already achieved in trained men, in production of all kinds of munitions, in ship-building and aircraft are amazing.

One of the many misjudgments of the Nazis was that the Dominions, holding (as they now do since the Statute of Westminster) virtual sovereignty, would remain neutral in the great European struggle. But Australia, with the other sister Dominions, spontaneously sprang into war against Hitler, immediately Great Britain fulfilled her promise to Poland. There was the same enthusiasm for the cause as in 1914, though this time Australia found herself in a more difficult position. In the former Great War, Japan and Russia had been allies, and there was no need to think of home defence. Now Australia has to be prepared for all possible eventualities. It was not expedient to send a large expeditionary force at once to Europe, apart from the fact that Australia no longer possessed the trained men, having repealed compulsory military training in 1928. Recruits, however, rolled up in great numbers for the militia and expeditionary force, and training centres were in full activity.

If, at the outbreak of war, there was a lack of trained men for military service, in other respects Australia was far better prepared than in 1914. There were more munition factories, greater iron and steel production, and engineering in all branches. All munition work was speeded up, and new factories built, for it was determined that Australia should become an Empire arsenal. Whereas in 1914

AUSTRALIA IS MAKING MUNITIONS : Aerial bombs, large and small, are being turned out in quantity at Maribyrnong Explosives Factory. Some 250-lb. bomb casings are seen *on the left*. *On the right* are rows of shells completed at another Australian factory near Melbourne

H.M.A.S. "KOOKABURRA" : One of the three new defence vessels built at the Cockatoo Naval Dock, undergoing her first trials in Sydney Harbour



AUSTRALIA IS MAKING ANTI-AIRCRAFT GUNS : These guns are Australian-made throughout. They were photographed at the Australian Ordnance Factory. They had then been tested and were ready for immediate use. Many others are almost completed

H.M.A.S. "AUSTRALIA," ONE OF THE MODERN CRUISERS OF THE AUSTRALIAN NAVY : This 10,000-ton vessel carries a complement of some 700 and is armed with eight 8-in. guns. The Australian Navy is stronger than that of many European Powers!

ADELAIDE: Capital of South Australia, founded in 1836. A view of the busy shopping centre of Duke Street

BRISBANE: Capital of Queensland; the principal seaport and chief commercial centre. A general view of the city, situated on the river of the same name

PERTH: Capital of Western Australia, founded in 1829, and separated from Melbourne on the east by no less a distance than 1,700 miles!

only rifles and small-arm ammunition were produced, in 1939, artillery, machine-guns, armoured cars, and every type of shell and bomb were already being manufactured, and all effort was turned to a huge increase in production.

One of the main efforts to which the Australian Government turned its attention was the Empire Air Training Scheme, whereby the Dominions—Australia, Canada, and New Zealand, with Great Britain, united to supply and train thousands of pilots, gunners and observers, and to produce aircraft, with the great object of making the Empire supreme in the air. Young airmen were to receive preliminary training in their own countries, and then proceed to Canada (chosen for its central geographical position and good flying conditions), where they would receive advanced training, till they were ready for active warfare in the air. This scheme was started in October 1939, and is now bearing rich fruit, hundreds and thousands of fully-trained airmen being sent out in successive waves. There seemed a long road of slow preparation to be tramped when it first originated, but the scheme was well conceived, and the success has been tremendous. The aim was nothing less than air superiority and a quota of 25,000 to 30,000 trained airmen leaving the schools every year. The first Australian air unit arrived in England in December 1939, complete with pilots, gunners, observers and mechanics, and a steady stream has flown from Canada since then. Young Australians joined the Air Force with enthusiasm, "destined," so Mr. Menzies declared, "to see the British Empire the first mistress of the air, as she has been these many generations the sure protector of the seas."

Ships of the Royal Australian Navy have been fighting alongside the Royal Navy since the opening of the war, gaining laurels at the River Plate, and in the Mediterranean. In the dockyards of Australia, destroyers are being built, local defence vessels constructed, and new shipyards laid down.

But the tremendous hum of war industry is to be found in the factories, where tanks, armoured cars, guns, aircraft, shells, and all forms of small-arm ammunition are being turned out. A Tank Corps of two armoured brigades is to be maintained, everything to be provided from Australia. It was not realised till the Conference at Delhi last summer, how great was Australia's contribution, and then the story of the rapidly increasing production came as a revelation.

It is said that aeroplane engines have come into production within six months of the receipt of blue prints, and anti-tank guns only four-and-a-half months after the arrival of drawings. The aircraft factories are throbbing with energy, the parts being made by various firms and then assembled, so that aeroplanes are being turned out at an ever-increasing pace.

As for the Australian Army, its prowess in Libya has brought it a world-wide fame. There was no shrinking from the increased effort and danger after the capitulation of France last June, the first contingent arriving in England about a week later—giving a tangible proof of Australia's "complete and indissoluble unity with the Allies." And now Australia is faced with grave danger at home, now that Japan, having joined the Axis, is making great claims to overlordship of the East. Troops have gone to Singapore, where their arrival was greeted with enthusiasm, adding yet more strength to the great British outpost; and as a proof of the solidarity of the Empire Singapore is regarded as the first line of defence in the Pacific, and Australians, in sharing in its protection, are taking an active part in protecting their homeland. The Dutch East Indies and Thailand have expressed great satisfaction in the growing strength of Singapore, but Japan, having fully assimilated the Nazi characteristics, considers that British defence is part of a plan to "strangle" Japan. The old, familiar Nazi technique becomes evident once again!

The part that Australia has taken in the great struggle of the democracies against the totalitarian tyrannies is an inspiring one, showing the unity of the Empire and the tremendous bond between the Dominions and the Mother Country. With a population less than that of London, Australia has made a truly splendid contribution in money, men and munitions, a contribution that continues to increase and multiply. "We are in this danger together," says their Prime Minister, "and by faith and work we shall triumph over it."

H.M.A.S. "ARUNTA": Australia is building a number of important naval vessels: this picture shows the first of the Tribal class destroyers to be built. She was launched at Sydney on November 30, 1940

AUSTRALIA IS MAKING HER OWN AEROPLANES: Wirraway planes (based on an American model) under construction at the Commonwealth Aircraft Factory at Melbourne. The construction of these for the R.A.A.F. has been considerably accelerated

H.M.A.S. "PERTH," ANOTHER CRUISER COMPLETED IN 1936: This vessel has a displacement of nearly 7,000 tons. She carries a complement of 550. Her sister-ship, H.M.A.S. *Sydney*, is a familiar name throughout the Empire through her many exploits

TIGER MOTHS UNDER CONSTRUCTION: These training planes for the R.A.A.F. are also being built in Australia under licence from the British de Havilland Company

"THE MORNING AFTER . . .": An anti-aircraft gun in Central London, which had been playing a lively tune the previous night, being prepared for further action. In cleaning the barrel, hot water is poured through it to expand the metal and open the "pores"—this facilitates the removal of all dirt and corrosion

MORE ABOUT THE NIGHT RAIDER—Notes on the Lesser-Known Duties of Our Anti-Aircraft Men

MUCH has been written about the work of our anti-aircraft batteries, yet many aspects of this most important occupation—perhaps the most important single job in the Army to-day—are not thoroughly understood.

Two instruments, the predictor and the height-finder, have been frequently described, and undoubtedly they are very remarkable appliances. But it is necessary to remember that all the complicated apparatus of predictor and height-finder, allied to electrical transmission and excellent machinery on the guns, cannot *ensure* that the shell hits the aircraft.

This is because the instruments are mathematical calculators, and as such depend upon rigid data. That is, they calculate on the assumption that during the time it takes for a shell to travel from the gun to the target, the target will maintain a "constant height" on a "constant course" at a "constant speed." Now this may often happen, particularly when an aircraft is oblivious of the danger below. Thus many raiders have been brought down, victims to the deadly precision of instruments which cannot fail—given a target moving without deviation.

But the human factor has ever baffled the mathematician. Once the pilot knows that the guns are below him, he can take evasive action, and give the predictor and range-finder the metallic equivalent of a sick headache. This point is worth remembering when we consider the problem of the night raider. What we want to develop is an instrument that will follow every evolution of an aircraft, then transmit continuous bearings to a gun so built that it can switch about with equal rapidity.

In connection with searchlights, how many people have ever considered the job of a very important man in the A.-A. battery—namely, the number who takes care of the lorry which supplies the current? His is a sufficiently lonely, unlauded occupation. His generator operates at the end of a 300-yard cable, and the lorry must be kept with engine carefully screened in some secluded spot. Should the generator fail, or be hit, then the whole battery might be put as effectively out of action as if all the guns and instruments were destroyed at once. The position is safer in populated areas, where current may be obtained direct.

A searchlight detachment consists of ten men. There are two "spotters," who sit in specially-constructed chairs—same breed as those favoured by business executives, with tactical modifications—placed on either side of the projector. They constantly scan the sky through binoculars. Number Three is the beforementioned lorry-driver. Then at the heart of the matter comes Number Four, hand on the control arm of the projector, and Number Five, the actual searchlight operator. Farther away again, the locator crew wait patiently at their great metal and wood trumpets, two for bearing and two for elevation.

They are joined to the projector by the "six-to-four" line, a field telephone, while at another telephone waits Number One, the N.C.O. in charge of the detachment. He gets hot news from Section Headquarters to warn him of approaching aircraft.

Already the searchlight detachments have learnt several useful lessons, and have begun to put them into effect. Controlling these powerful instruments, it has been found, involves a special technique of movement. The slightest deflection may render the beam temporarily useless, so the crews have concentrated more and more upon careful procedure.

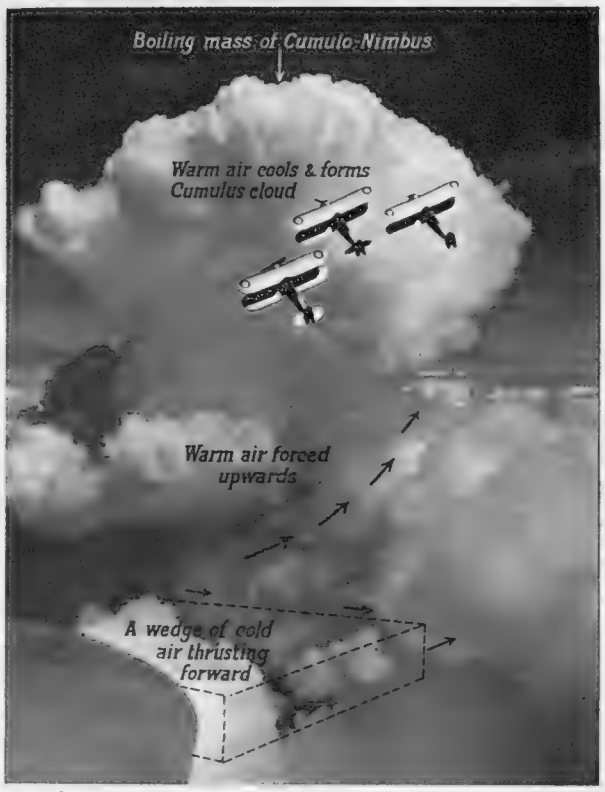
Another development is in the mobility of searchlight detachments. Anti-aircraft defence has become less and less rigid as the war has advanced. We now have many mobile units which can be rushed from place to place in the event of a massed attack. They are similarly massed in that event, and we have the spectacle, familiar to many people, of the heavens literally ablaze with light. Actually, there has been an application here of the principle of the box barrage to the searchlight.

Perhaps the greatest enemy of the A.-A. crew is time. Here are a few facts and figures. Aircraft travelled from 80 to 120 miles per hour in the Great War, but even then the A.-A. guns found it difficult to keep pace. There is the famous story of the pilot who noticed something travelling alongside him at his own speed, and suddenly realised it was an A.-A. shell. To-day the raider just about trebles the speed of his Great War forerunner. So a principal aim of the A.-A. research worker is to increase the velocity of A.-A. shells, and to reduce time in subsidiary processes. Electrical transmission to the guns of data from the predictor, for instance, saves about eight seconds as compared with the old, manual method. Eight seconds! But that means, reduced to its mathematical extreme, that the shell speeds to the target exactly half as quick again.

Probably the A.-A. guns that defend Britain to-day are the most accurate weapons ever invented by man. D. C.

SEARCHLIGHT TACTICS EXPLAINED: With the aid of knitting needles to illustrate the path of a searchlight's beam, and a tiny model of an aeroplane, a class is here being instructed in searchlight tactics. This picture was taken at an anti-aircraft Divisional Training School for officers and men in the Western Command

THE SORT OF CLOUD-FORMATION THE ENEMY BOMBER LIKES: The Germans have shown a marked preference for cloudy days for their daylight bombing attacks on this country—although the volume of these has slackened noticeably of late. By making use of cloud cover it is possible for the slower bomber to elude the fighter aircraft which would assuredly get him were he not enabled to obscure his intentions by ducking into the clouds when detected



WEATHER IN THE MAKING: The cold air below, thrusting forward, forces the warmer air upwards: the latter rapidly cools and forms banks of cumulus clouds, so familiar in the sky in fair weather. The typical billowy nature of the cumulus is well brought out in this picture. The aircraft are the famous Gloster Gladiator fighters

CLOUD LORE FOR CLOUD WATCHERS

AIRMEN, and particularly those who have to fly long distances, not only have to be good navigators and skilled in coaxing the best from their machines, but must be expert in weather lore as well to make full use of these other qualities. For instance, they must know the sort of weather which may lead to icing conditions and how to select a safe level at which to fly, they must recognise the different types of cloud and what they portend. They must know the phenomenon of a "cold" front and a "warm" front and the signs which indicate them.

Most weather signs can be read in the clouds. There are, in fact, four main divisions into which clouds can be grouped. They are:—

(1) Low levels (below 7,000 ft.)—Cumulus cloud, stratus clouds, and strato-cumulus clouds. (2) At medium heights (7,000 to 10,000 ft.)—Alto-cumulus and alto-stratus cloud. (3) High up (above 10,000 ft.)—Cirrus, cirro-cumulus and cirro-stratus. (4) Starting low down and extending to the higher levels—Cumulo-nimbus cloud. What each of these clouds

is like and what it indicates should be known to all flying men.

Cumulus clouds are familiar to everyone. They look like bunched-up cotton wool, soft and rolling. They are caused by convection currents of air and indicate stability within the air masses.

Stratus cloud is the name given to a "sheet" cloud forming a complete "overcast." This is brought about by cooling air from below acting on warmer air masses.

Strato-cumulus is a mixture of both stratus and cumulus, as the name implies. It has a bunched-roll appearance. Alto-cumulus and alto-stratus clouds are more extended forms of the plain cumulus and stratus. An alto-stratus cloud is often ragged at one edge, but piles up into a solid layer behind.

Cirrus clouds are thin blown clouds high up. They indicate fine weather because they are formed by layers of warm air spilling over a colder mass. The cirrus cloud is made up of minute ice crystals in suspension. Sometimes these clouds gather into thunder "cirro-stratus" when the whole sky appears like a thin transparent sheet high up. This happens when the warm air descends. Rain or snow falls from cirro-stratus.

The most troublesome cloud for the flyer is the cumulo-nimbus, which may extend to enormous heights. It is the thunder cloud, and very strong vertical currents may be met within it. The cloud looks as though it were boiling, with movement taking place all the time.

The familiar "mackerel sky" is formed by alto-cumulus. Still higher is the cirro-cumulus. Movement of warm air over cold air at heights causes these clouds and often indicates high winds.

Now, this business of the cold front and the warm front so often met within the air: these fronts are graduation between moving masses of cold and warm air.

A cold front occurs when a mass of cold air moves forward against a mass of warm air and forces the warm air up. The warm air rises on top of the front, which drives forward underneath it like a wedge. The warm air cools and the result is cumulus cloud and showers of rain.

The cold front moves faster than the warm front, which is caused by warm air which flows slowly forward over a mass of cold air. Again the warm air is lifted and forms alto-stratus clouds because of the slow process of lifting and cooling. As the front progresses, cirrus is formed high up with cirro-stratus in between the cirrus and the alto-stratus. Rain or snow falls beneath the alto-stratus. Both cold fronts and warm fronts produce conditions of low visibility for flying and in winter a warm front will be attended by icing troubles. By climbing into the warmer air on top, then beyond, this may be overcome.

WEATHER AND THE PILOT

MODERN instrument-flying has removed many of the terrors of the weather from long bombing raids. Without all the modern aids to navigation and blind flying, few of the long night flights over enemy territory would be possible, however perfect the aeroplanes in other respects. Nor could the steady stream of bombers be delivered by air across the Atlantic.

Only three types of bad weather seriously interfere with flying nowadays. They are: (1) fog over the aerodromes; (2) electrical storms—usually associated with thunder; (3) very severe icing conditions.

Fog is perhaps the worst enemy of flying, especially when it forms while the aircraft are out on a raid and have to get down somehow on their return. Nevertheless, science has concentrated on overcoming some of the hazards of fog and blind-landing equipment is installed on many British bombers and all German bombers.

Blind take-off presents fewer problems and can be made successfully by any experienced pilot with his normal instruments. Once in the air, blind flying is a normal procedure, and with the aid of the artificial horizon, the turn and bank indicator and the sensitive altimeter has become an everyday occurrence. The automatic pilot also eases the pilot of much strain on long flights in bad weather, although in very rough conditions it is liable to be a little violent in correcting the bumps.

Electrical storms are more rare, but dangerous when encountered. They are likely to put the radio and the instruments out of action, and when combined with fog may force a crew to bale out. Severe icing may occur in the van of a "warm front" in winter. The saturated air just above freezing-point is "touched off" by the passage of the aeroplane through it, and ice is liable to form on wings, controls and airscrews.

In general, cloudless blue skies are favourable for the big daylight formations of a few bombers escorted by many fighters. On the other hand, overcast skies favour the single "cloud-hopping" day raider, which can fly blind to its objective or fly above the clouds and then dive through to the attack. Such tactics are difficult to counter.

At night the bomber-pilot prefers broken cloud, which provides both a screen from searchlights and anti-aircraft fire and yet gives glimpses of the ground for navigation checks and a sight of the target when it is reached. Moonlight helps the night bomber immensely, and a full moon and broken cloud low down are probably his ideal. Ground mist rising over the aerodrome before the return is the chief bugbear. High winds are a nuisance, because they invariably reduce the range.

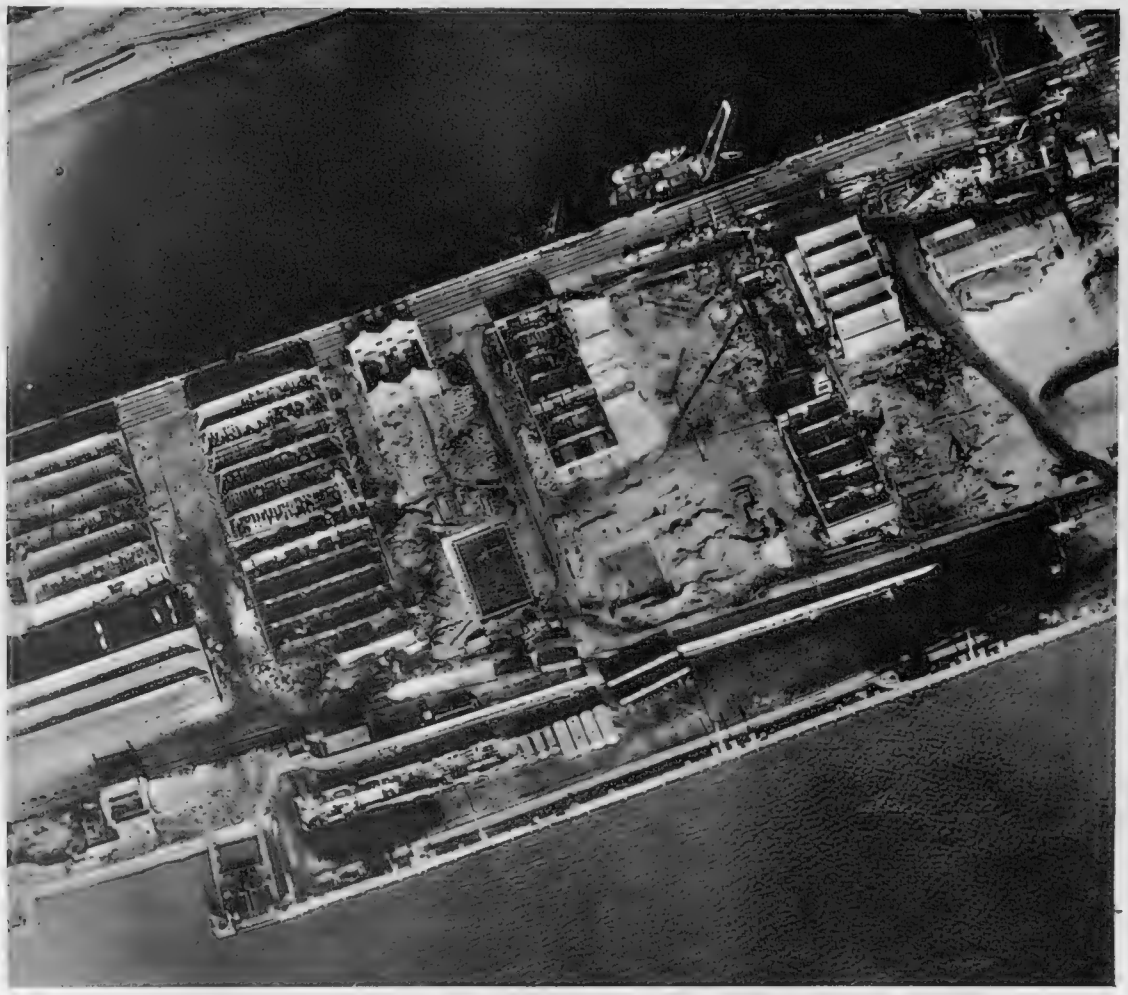
Over England the fighter-pilot prefers the cloudless sky, although new tactics are constantly developed to take advantage of different types of weather. As aeronautical science develops, the air forces of the world are likely to become more independent of the weather. Already military operations are carried on in a normal manner on many days on which no operations would have been possible at all during the last war. Aerodromes have proved a weak link in the operations, and are far more affected by weather than the machines themselves.

Drawing by Roland Davies

HOW THE NIGHT-FIGHTER SEES THE ENEMY BOMBER ABOVE THE CLOUDS

Although a dense cloud-layer may obscure the heavens from the watcher on the ground, above the clouds it may be quite clear with brilliant moonshine. The searchlights cannot penetrate the dense mass of cloud; but to the night-fighter patrolling high up above, the bomber is clearly lit up against the moonlit clouds. It is on nights like this that the night-fighter makes his best bag

AND THIS IS HOW THE CLOUDS APPEAR TO THE PILOT FLYING ABOVE THEM: The floor is here composed of cumulus clouds, which may be many thousands of feet above the ground, and which may be hundreds of feet in depth; above the cumulus is another layer—of cirro-stratus. Actually, this formation indicates that a "cold front" is catching up a "warm front"; all the signs go to show, therefore, that rain is on the way and will soon arrive



WHAT THE R.A.F. HAVE DONE TO THE DOCKS AT OSTEND

Once a delectable little spot to which thousands of English visitors were wont to journey, Ostend has, for many months now, been in German hands; and, consequently, the target of both naval and R.A.F. attacks. Some idea of the damage inflicted on the docks can be gained from this excellent official photograph. What was once an active block of warehouses on the West Quay of the Bassin de la Marine is no longer operative, and warehouses on the West Quay of the Bassin à Flot are also severely damaged

AIR COMMENTARY by C. G. GREY
(Founder of "The Aeroplane")

GIVING THE PILOTS WHAT THEY WANT

—And an Admiral's Ideas on Air Attack

YEARS and years ago there was a blazing row between Admiral Sir Percy Scott, the gunnery specialist, and Admiral Lord Charles Beresford, who bombarded Alexandria, both since deceased, much to the diminution of the joy of nations. Commodore Scott, as he was then, I think, was going to take his squadron out into the Channel for gun practice, when a signal came from Lord Charles, his Admiral, telling him to clean up his ships for a review, or inspection, or something. Scott made a signal to his ships—"Spit and polish is more important than gunnery"—and transmitted the Admiral's order. I forget whether Scott was court-martialled, but the incident rather cramped his career.

For years I have held that there is far too much spit and polish about our aeroplanes, and that man-hours have been wasted wholesale which might have been spent on producing greater quantities. And here one has to distinguish between quantity-production and mass-production, as well as between saving on spit and polish and decreasing quality. Quality, meaning speed, handleability, and strength, must never be sacrificed to quantity-production.

A pilot friend told me the other day that a certain new machine was so roughly finished that one had to get into it with gloves to avoid cutting oneself on the rough edges and corners inside, but that it was a peach to fly. That is good news. Cutting out the polishing of corners means saving man-hours. So the Ministry of Aircraft Production is evidently going the right way to work.

Somebody wanted to know, in print, lately, who was the real boss, the Air Ministry, which runs the Air Force, or the Ministry of Aircraft Production, which arms it? The position is odd, for Lord Beaverbrook, who is M.A.P., is in the War Cabinet, and Sir Archie Sinclair, the Air Minister, although by definition "One of his Majesty's Principal Secretaries of State," is not in the inner ring.

That writer put the blunt question, which would have priority if the Air Staff wanted a new type hustled through to beat the enemy by quality and if, contrariwise, the M.A.P. wanted to hustle masses of obsolescent types through in the hope of beating him by quantity? I should say neither. In the first place, with a few pseudo-scientific exceptions, the M.A.P. folk are as keen as the pilots and air-crews on getting the best and most efficient machines. Only some of the scientists are what is currently called a "bit of a bind," because they *will* stand on their absurd professional dignity.

On the other hand, if the M.A.P. did try to block work on new types so as to hustle quantity-production, I have enough faith in the Air Staff to believe that they would resign their appointments in mass as a protest. And no Minister could stand up to that.

Lieut.-Colonel Sir Henry Tizard, A.F.C.—Talking of science and technical affairs, and reading of the justifiable emotion of the First Lord of the Admiralty, Mr. Alexander, when one of our little anti-submarine corvettes sent a signal from mid-ocean saying that it was going to engage a surface-raider, reminds me of Sir Henry Tizard—Lieut.-Colonel, A.F.C., of the last Anglo-German war, and still consultant on Research to the M.A.P. The stories of his resignation may have been based only on his illness, but some who worked near him thought otherwise, and believed that his ideas so differed from those of influential people that his work became impossible.

In the War 1914-18 Henry Tizard's eyesight prevented him from going on active service, but he became a fine test pilot and one of the special investigators at the R.F.C. Experimental Station at Orfordness, near Felixstowe. At that time our people, especially the Archie-gunners, much wanted to know the cruising height and speed of the new twin-motor Gotha bombers, the latest "secret weapon." One day, cruising round in a D.H.9, with gunner, guns and full war equipment, and, on top of that, thermometers, hygrometers, barometers, and all other measuring instruments to test exact performance figures, Captain Tizard ran into a formation of Gothas.

He sat behind them just out of machine-gun range, and made notes of temperature, humidity, height, etc. Having made his notes, he put them into a message-bag, attached to a small parachute, addressed to the Officer Commanding, Orfordness, and dropped it overboard. At the bottom of the notes he had written, "I now propose to engage." And he sailed in and fought till his ammunition was gone.

Keeping Touch with the Front Line.—But to revert to that question of quantity or quality. What happens in fact is that every designing firm, whether of aeroplanes, motors, guns, bombs, instruments or what-not, is so closely in touch with the active service pilots that it knows exactly what they want. Many firms have their own "outside engineers" living with the squadrons, to find out at once what modifications of the first, or prototype, products are wanted. So, if any defects, or needs for improvement, are found they are probably being put right by the time they have penetrated to the technical sections of the M.A.P. or Air Ministry.

Moreover, most firms go ahead with the jobs, when they find what is wanted, without waiting for the technical people or the contracts department or the Treasury officials to give their consent or decisions. But none can deny that there are lamentable hold-ups, especially in experiments with revolutionary ideas.

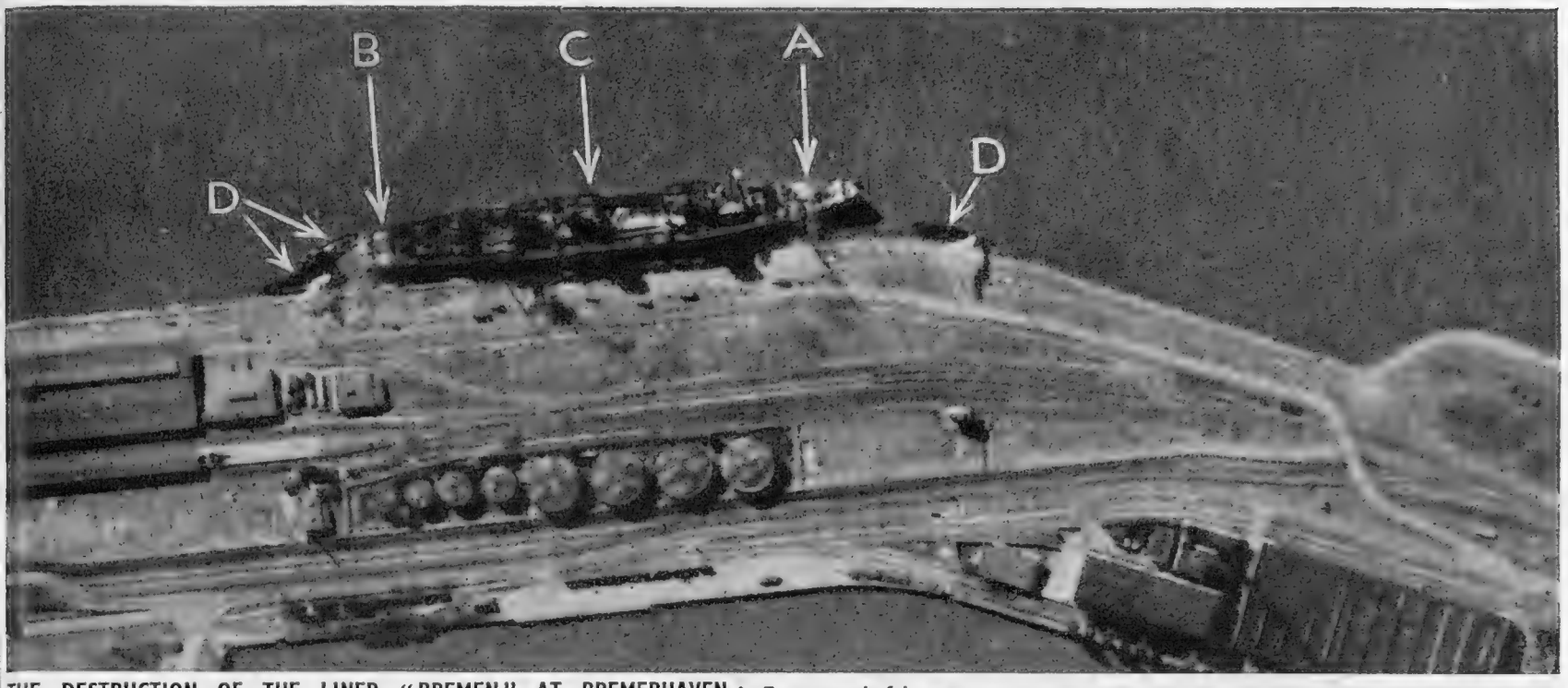
Mr. Hamilton Kerr, M.P., on the introduction of the Air Estimates, urged his Majesty's Government "to mobilise all the means of research at its disposal so that we may retain this all-important advantage of quality in the struggle which lies ahead of us." That is news and ancient history at the same time.

650 m.p.h.—A piece of news which has struck the un-air-minded man is the report of an American pilot, Mr. MacDonough, doing a dive at 650 m.p.h. in a Bell Airacobra—known in the R.A.F. as the Caribou. Naturally, the newspapers hailed it as a Record—which is nonsense. One cannot get reporters and sub-editors to distinguish between a Record performance and the best performance on record. They are two quite different things.

There is no such thing as a diving-speed record. But a machine which does a dive at 650 m.p.h. recorded on a fairly-to-averagely accurate air-speed indicator is a mighty good aeroplane. And if anything else can dive as fast and pull out of the dive

ON BOARD H.M.S. "KING GEORGE V," BRITAIN'S NEWEST BATTLESHIP

One of the Walrus aircraft carried in the vessel returns from a patrol and is hoisted aboard. This type of single-engined amphibian is used in all naval vessels which are equipped with catapult-launching gear. Judged by modern standards, it is not a fast aircraft, but it is ideal for the conditions under which it is called upon to operate



THE DESTRUCTION OF THE LINER "BREMEN" AT BREMERHAVEN: Two wonderful pictures taken by the R.A.F.: It is only a few days ago that the Germans announced that their crack Atlantic liner, the *Bremen*, was on fire at her berth at Bremerhaven. Yet the R.A.F. have already had a look—a highly successful look, as the two accompanying pictures show—at the results. According to reports from neutral sources, the liner is now a complete wreck. The reader can judge for himself! The pictures were taken by a reconnaissance aircraft of the Bomber Command. Although the German announcement stated that the fire started from an unknown cause, it is significant that the Bremerhaven Docks were attacked on the night of the 13th-14th March as an "alternative target" by a single British aircraft. *On the right* the *Bremen* is marked **A**; her sister-ship, *Europa*, is indicated at **B**. In the *upper picture* the *Bremen* is shown in closer detail, with smoke pouring from her bow and stern, whilst amidships she appears to be burnt out. The three small craft are apparently being used in a vain attempt to put out the fire. **A**—bow smoking; **B**—stern smoking; **C**—amidships burnt out; **D**—small craft

without leaving its wings or tail behind it also is a good aeroplane.

I have always liked the Airacobra, even when technical people here were making a mock of it. It is so slim and sleek, and gives such a grand view for the pilot. Also there are brains in its design. The buried engine is good. And putting it on the Centre of Gravity is good—for the Allison is, I believe, 2 ft. longer than the Merlin, and heavier, so if it were stuck out in the nose it would be like whirling a club around.

Also I am pleased about the shaft drive. Ten years ago or more I wanted shaft drives, and then a pompous ass with a slide-rule, who somehow had bluffed himself into having a reputation as an aircraft designer (approved), told me that a shaft drive could not be got for less than 1 lb. per h.p.—a pound a horse-power, think of it—1,000 lb. weight for the shaft alone of a 1,000-h.p. motor.

Well, the Fiat people and Claude Dornier and the Junkers folk and now Lawrence Bell have knocked that nonsense sky-high. And I suppose that we shall have to wait as long to prove my faith in slip-wings and seadromes and dried grass and such-like fad or hobbies.

Perhaps my liking for the Airacobra is influenced by my liking for its big sister, the Airacuda, the twin-pusher fighter-bomber—which we do not seem to have bought, probably because it is still an experiment. And I may be influenced by my liking for Lawrence Bell, who, when he was here some few years ago, struck me as being about the most practical and least self-assertive aircraft designer I had met.

And, as a piece of news behind the news, did you know, or would you have suspected, that American pilots who fly bombers over here, and some of the better and more experienced American ferry pilots who are working here, have been writing home saying how good our standard fighters and bombers are? Believe it or not, but somebody does think that our aeroplanes are worth writing home about. Isn't that news?

Bombs Versus Ships Again.—One of the joys of writing in this paper is that it brings one so many charming letters from well-informed people criticising the naturally ultra-aeronautical views in these articles. Lately one came from a distinguished Admiral (retired) attacking me mildly on my article on "The Mediterranean and Dive-Bombers." He accuses me of arguing that "battleships are useless because they cost from £6,000,000 to £7,000,000 and bombers cost about £20,000, and that therefore our proper policy is to have bombers and not battleships."

The Admiral rather begs the question. What I said was that "for £1,000,000 you can have 100 bombers (say, 50 at to-day's price). If all those bombers, some carrying torpedoes, are flung against one battleship, they may lose twenty-five or fifty of their number, but they will put that ship out of action for keeps, or the duration."

Now that is not saying that battleships (or more properly, capital ships) are useless. So long as they do not meet 50 or 100 aeroplanes at once they are probably queens, or kings, of the sea and can do a lot of damage.

Farther on the Admiral says: "It is not correct to talk about 'battleships,' you ought to talk about 'capital ships.' If only all the Navies of the world could suddenly be sunk to-morrow, then the Powers no doubt when rebuilding would be enchanted to agree to a capital ship of about 20,000 to 25,000 tons, costing about a quarter of the price of battleships." Very true, but how long would the politicians of any country trust the politicians of any other country to stick to the bargain?

Then he says: "As you know, it is essential that our convoys should reach this country safely. Supposing we had no battleships and that Germany had them, every time one of her battleships met one of our convoys escorted by lesser ships, she would sink as many as she could catch, and this would continue indefinitely until we had no Merchant Navy left."

But put that proposition the other way. Suppose that we had unlimited aeroplanes and the Germans had none. How long would the German shipyards and ships exist?

Those Air Experts.—The Admiral says: "You air experts will always talk as if a battleship cannot stand up to bombs. They are built to stand up to big armour-piercing shells, and a 15-in. shell, if I remember rightly, weighs about a ton. Armour-piercing shells have far greater penetration than bombs. A bomb's initial velocity is nil and the remaining velocity of a shell is always greater than a bomb." Later he adds, of the sinking of the *Southampton*, "of course one cannot armour cruisers against the air."

I should hate to be an "air expert." So far as I remember I have always argued that though a battleship, or capital ship, may be proof against bombs, it cannot be proof against a mass attack with torpedoes. If launched from aeroplanes, they may not sink the ship, but they will put it out of action.

But a more important fact is that we now know that air attacks *can* put the capital ship's screen of destroyers and cruisers out of action—if there be enough aeroplanes resolutely flown—and thus leave the big ships naked against attack by aeroplanes, destroyers or submarines.

On December 11, more than three-and-a-half months ago, I wrote, elsewhere, "The ideal remedy [for attacks on convoys] is air escort backed by battleships and cruisers—of regular shipping lanes, along which each ship could go at its own best speed, instead of tying the fast ships to the slowest. . . . With modern big flying-boats the patrols (from Ireland and Newfoundland) could easily meet one another in mid-Atlantic. Then in mid-ocean we could keep two or three of our big new aircraft-carriers . . . whose aircraft would patrol North and South of the shipping lanes to make sure that no commerce raiders were waiting out on the flank. . . ."

That was before anyone suggested reviving the seadrome idea, and, so far from decrying battleships, I asked for them. Now I hear, on admittedly interested authority, that the Air Force is quite keen on trying out the seadrome idea, at any rate, with a big mock-up, but that the Navy is dead against such a trial being allowed.

"Stuffy" in the States.—From a United States paper dated January 23, a long time coming, but full of new news, I learn that Air Chief Marshal Sir Hugh Dowding, lately Air Officer C.-in-C., Fighter Command, has been doing good work in the States. Says the paper: "Dowding's nickname is 'Stuffy,' and his advance notices were far from favourable. Although supremely qualified to speak with authority by his experience as commander of the Hurricane and Spitfire pilots who saved Britain in the frightful six days of September, he was said to be the least promising envoy to America.

"Now, however, he has begun work with our generals, has met informally with many non-military high officials and has lectured at the War Department to the top men in the Air Force. And although some of our air experts consider him somewhat optimistic, he has made both a good impression and carried conviction." Well, nobody could say fairer!

The paper goes on: "Dowding's most dramatic report concerned progress made on the British device for combating night air attacks. The nature and even the effects of the device are closely guarded military secrets."

That means that in due course American night-fighters will arrive ready fitted with "the device," instead of waiting to be fitted here. And we shall have more for our own machines. Which is good, for, as I wrote weeks ago, "the device" is all right, but we must wait for supplies, and for air-crews to be drilled in the use of it.

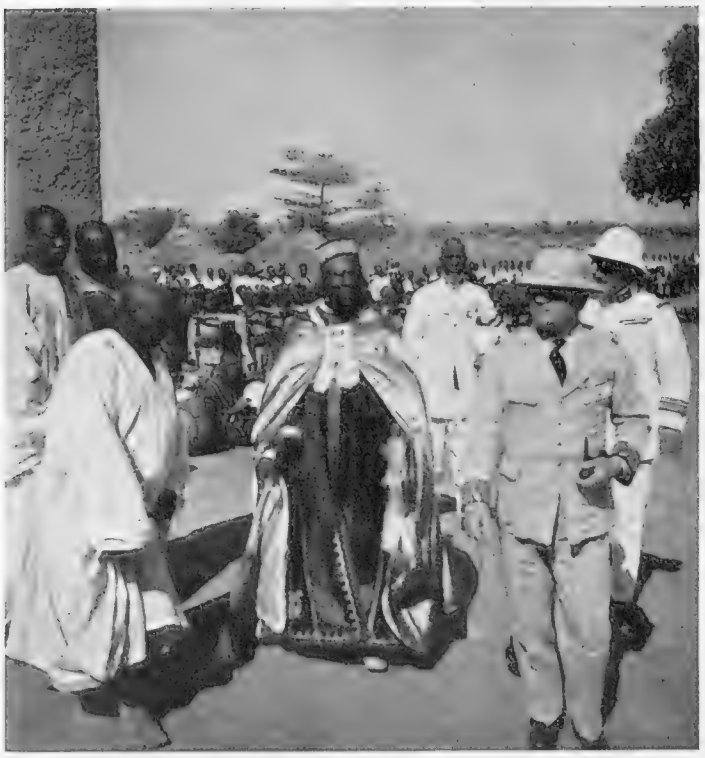
There is a lot more about us in that article, which says that Sir Hugh said that in the "Coventry raid a rifle factory and a plant making the small Siddeley engines for training planes were the only ones serious (*sic*) damaged, while the city's machine-tool shops and the vital Rolls-Royce engine factory near by escaped virtually unscathed . . . And he insists that, although the rate of increase has naturally been slowed by bombing, British aircraft production is still gaining perceptibly every month"—which we know.

"Moreover he states that . . . only one major final assembly plant, Short's big factory at Rochester, . . has even been hit so badly as to be put out of production for a substantial time. . . . He contends . . . that the Germans used all their air power in the September attack. Many of our experts doubt him, but have difficulty answering his question: Why should the Germans have held back?"

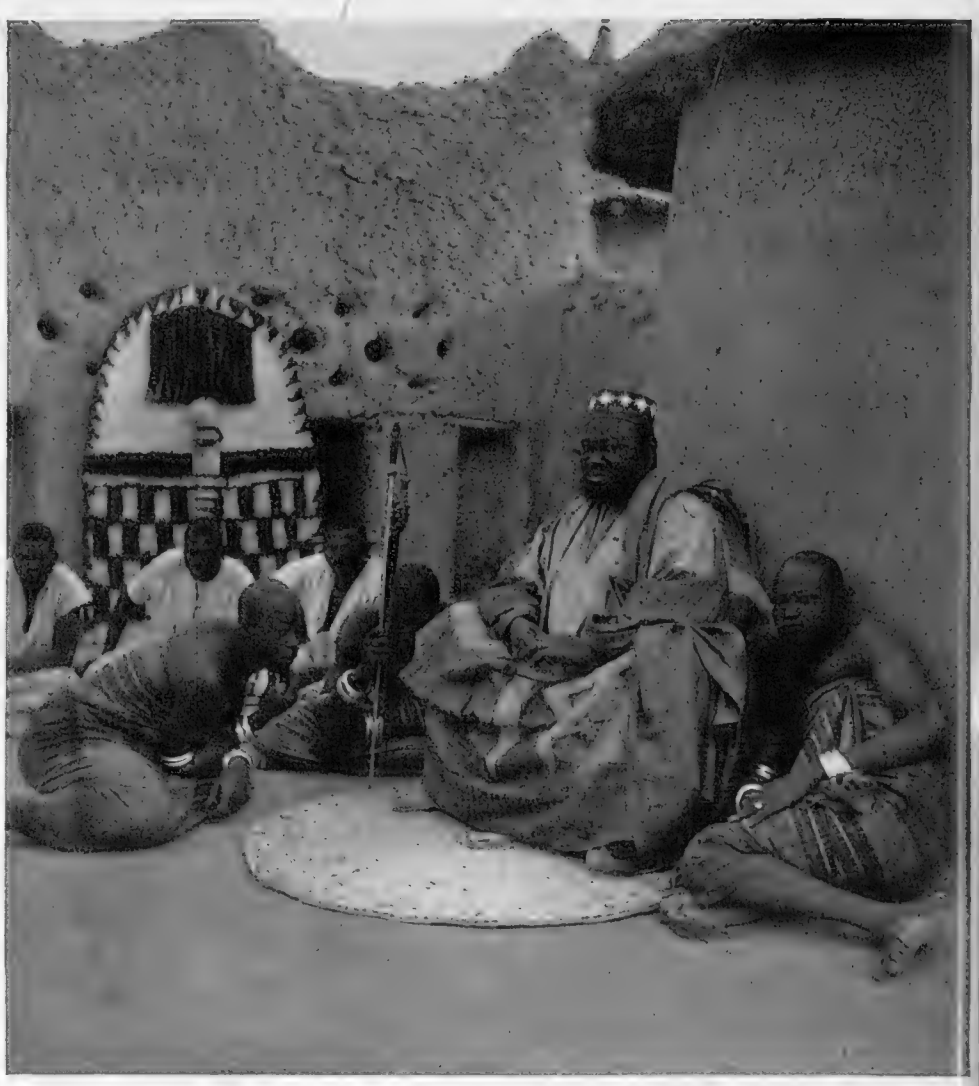
There is also some interesting chat on guns, but that must wait.

WHERE FRANCE RECRUITS PART OF HER AFRICAN ARMY

The Picturesque District Inhabited by the Mossi, Many of Whom are Recruited into France's Native Regiments in Africa



THE EMPEROR OF THE MOSSI, MOROLI NABU, who rules over 2,000,000 people in the Mossi country, many of whom are members of the vast Black Army of France. The Nabu lives in a palace at Wagadugu, as his family has done for nearly 1,000 years. With him in this picture is M. Croccichia, who was French Governor of the Ivory Coast before the war

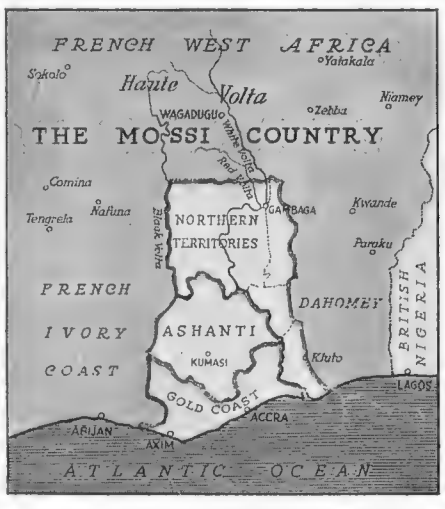


IN THE EMPEROR'S PALACE AT WAGADUGU, IN THE FRENCH SUDAN: Every morning the Emperor takes part in an important ceremony in his courtyard. Surrounded by his bodyguard, he listens to the Royal Musicians who extol in song his virtues as a warrior and ruler

RECRUITING FOR THE FRENCH ARMY BEGINS: The Emperor supervises the enrolment of the raw recruits, and is himself supported by French Colonial officers

THE RECRUITS ARE NOW FULL-FLEDGED SOLDIERS OF FRANCE: The Trooping of the Colour in a native military camp before the embarkation of the contingent to join the Armies of France

In the huge territories which composed the *Bloc Africain* before the war, there is a picturesque district ruled by a dark-skinned Emperor. He is the Ruler of the Mossi, exercising local control of the region under the supervision of the French Colonial Government. The district here pictured lies due north of the Ashanti Northern Territories which, together with the Gold Coast, form a British wedge between the French Ivory Coast and French Dahomey. The territory of the Mossi, with its capital of Wagadugu, is bounded on the west by the Black Volta and on the east

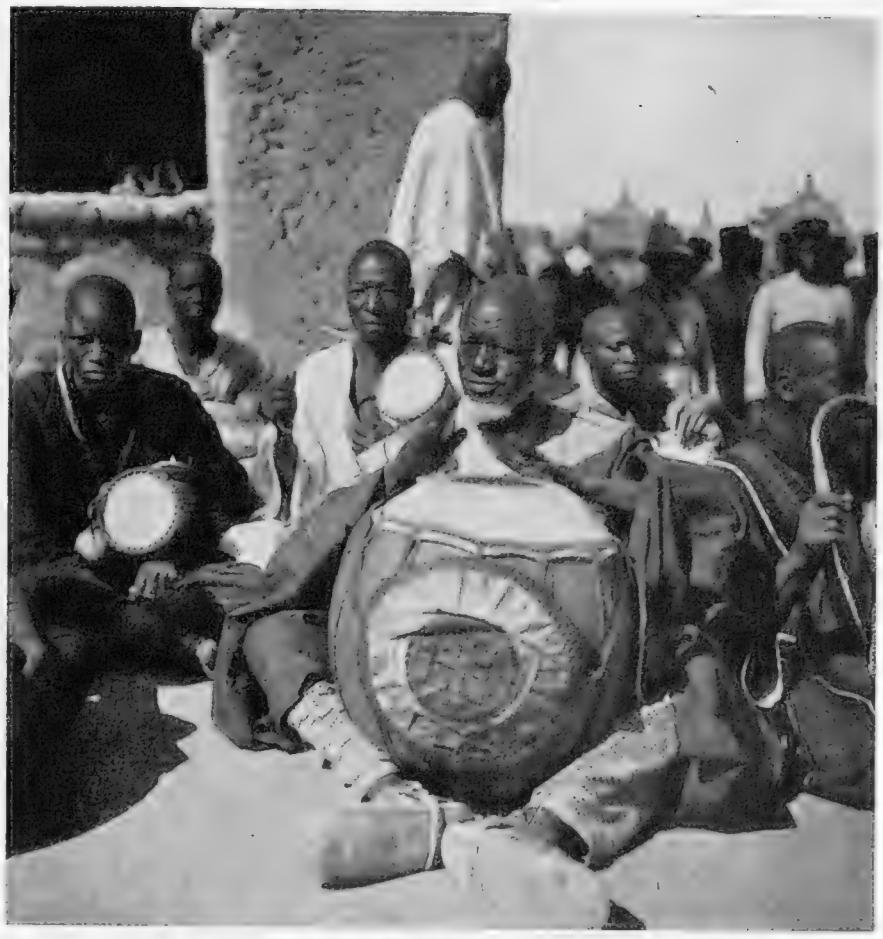


by the White Volta, northern branches of the river system which becomes the Volta River and flows into the Bight of Benin, east of Accra.

From this region the French have recruited many of their native soldiers. Their port of departure from the Mossi country to their various garrison stations elsewhere is Dakar, a port very much in the news since the defection of France. For many years native troops have provided that country with a staunch bulwark and probably are still doing so.

Most of the inhabitants of this part of Africa "are full-blooded negroes who, until recently, were little removed from the savage state." Nevertheless, should the war extend to North Africa, and should France in consequence become involved in military operations once again, it is men like these upon whom she will have to call!

I CAMP MANGIN AT WAGADUGU, THE BLACK ARMY EVEN HAS ITS OWN NATIVE TAILORS FOR THE FASHIONING OF MILITARY UNIFORMS

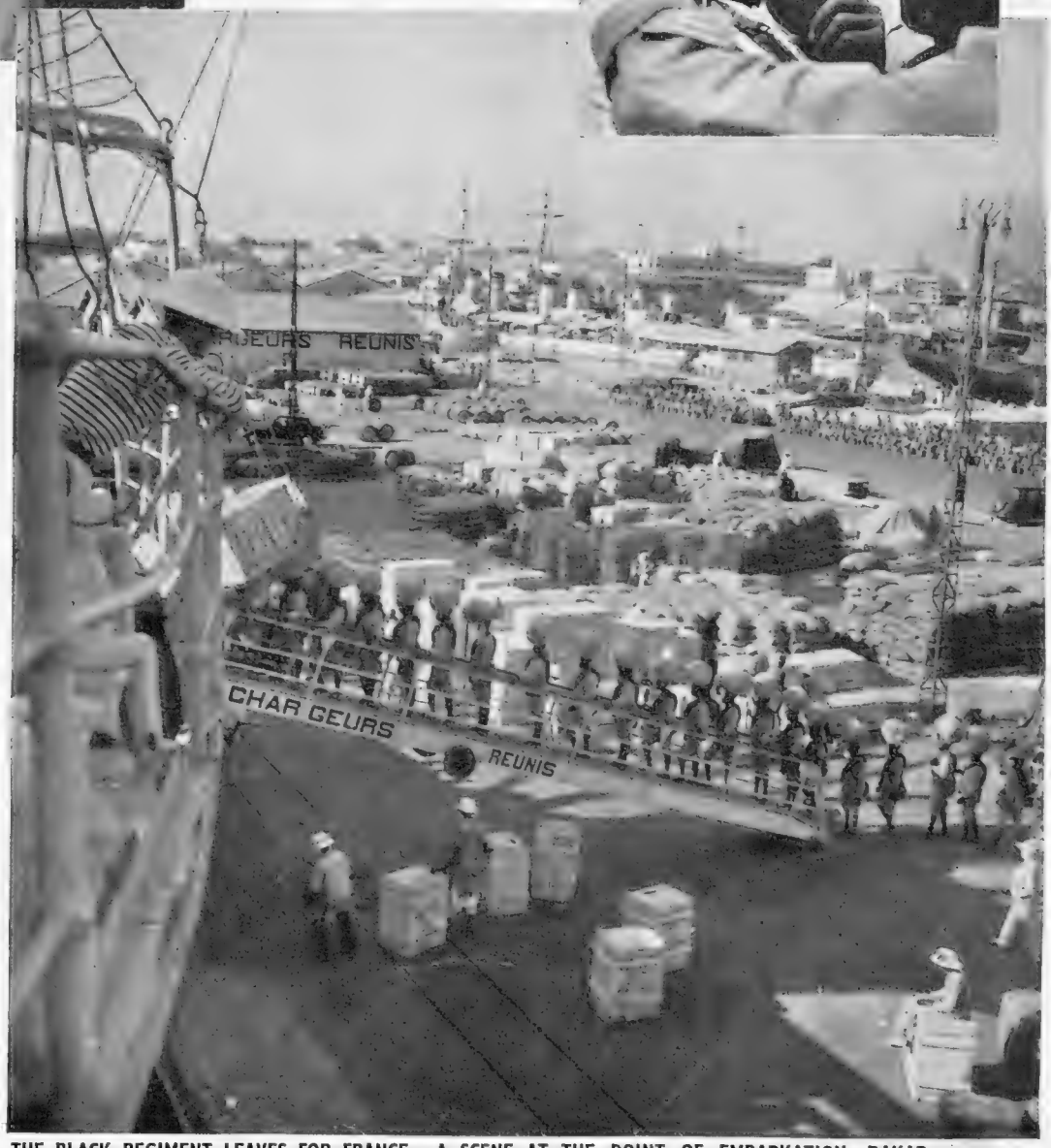


THE EMPEROR'S MUSICIANS GIVE A PERFORMANCE IN THE COURTYARD OF THE ROYAL PALACE AT WAGADUGU

IE TRAINING OF A SOLDIER : PRACTICE ON THE RIFLE-RANGE FOR THE NEWLY-JOINED RECRUITS

On right—A NATIVE SOLDIER IS TAUGHT ONE OF THE NICETIES OF "CIVILISED" WARFARE

E FINISHED PRODUCT : THE RECRUIT HAS BECOME A HIGHLY-TRAINED AND COMPETENT FRENCH SOLDIER, AND A VALUABLE ADDITION TO THE COLONIAL ARMY

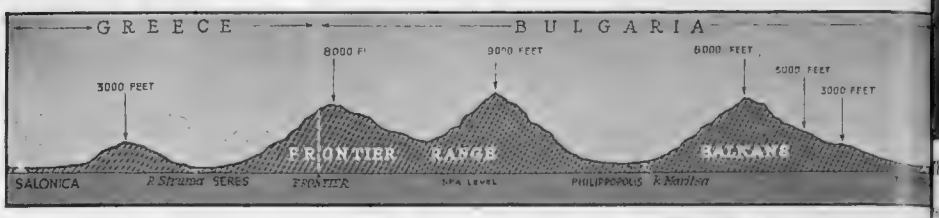


THE BLACK REGIMENT LEAVES FOR FRANCE. A SCENE AT THE POINT OF EMBARKATION—DAKAR : This very surprising view gives some measure of the importance of the West African port. Tall modern buildings, numerous wharves, and piles of produce everywhere, indicate the peacetime volume of merchandise flowing through this busy spot. France's Colonial Regiments form a very considerable part of her Forces outside the Motherland

Above—THE MOUNTAIN RANGE OF THE RHODOPE, ALONG THE BORDER, WITH THE PASSES LEADING FROM BULGARIA INTO GREECE: SHOWING ALSO THE MOTOR ROADS

On right—A CROSS-SECTION THROUGH BULGARIA, FROM THE DANUBE TO SALONIKA, SHOWING THE MOUNTAIN RANGES AND THEIR HEIGHTS

Below—THE THRACIAN PLAINS, FROM SALONIKA TO THE TURKISH BORDERS, WITH THE RAILWAY COMMUNICATIONS



IN Bulgaria, which is now entirely subservient to him, Hitler has collected some twenty divisions; five at least of these are armoured, and the remainder are fully mechanised. Over the five Danube bridges which he has been using for the past three weeks he can daily pass four divisions of all arms over four of the bridges, reserving the fifth for the passage of munitions only.

The total lengths of the frontiers are, respectively: Greece-Yugoslavia, 110 miles; Greece-Bulgaria, 180 miles. Both frontiers are ranges of formidable mountains. The only gaps leading south through them are (1) on the west, a pass near Dojran (east of Monastir), through which runs a railway from Belgrade to Salonika; and (2) the Rupell Pass on the Greco-Bulgarian frontier. Through this pass runs the Struma River, and a mountain road gives communication through it. Both passes can be so strongly held by determined and well-armed troops aided by active air forces that it would be impossible for the best troops in the world to force them under such conditions.

The pass near Dojran has long been fortified by the Greeks, and General Metaxas saw to it that the Rupell Pass was rendered quite impregnable by blocking the Struma River with huge rocks detached from the mountain-side, and the road and all commanding heights are impregnably defended by suitable machine-gun nests, detached posts, obstacles, land-mines, and all the other accessories well known to the military engineer. At the eastern end of the Greco-Bulgarian frontier, but within *Turkish* territory, runs another Bulgarian stream, the Maritza, which flows seaward at Dedeagatch. Thus the German High Command have a choice of three approaches whereby they may break into Thrace for the purpose of seizing Salonika and the seaboard, and thus—as they hope—establishing at least one submarine base at Salonika and possibly another in a smaller bay further east.

Only the western and eastern approaches are served by railways which, owing to the natural features of the country through which they pass, make it impossible to increase their carrying capacity appreciably, so they are of no great military value for the purposes of supplying any army of considerable size which may be operating in Thrace.

The terrain north and south of the Greco-Bulgar frontier also presents many obstacles to the free movement of troops and supplies on their southward march.

The Rivers Struma and Maritza, both Bulgarian streams for the greater part of their course, rise at the western end of the Rhodope Mountains, and for some distance form parallel valleys with formidable mountain slopes between them. These slopes are heavily wooded, particularly on their northern side. There are but few roads across them and none are suitable to carry continuously such heavy military traffic as we here contemplate.

So long as Yugoslavia resists, the western approach to Salonika is clearly denied to Hitler, nor dare even he or his military chiefs risk a march southward along the Yugoslav western frontier, even were they to seize the Belgrade-Salonika railway, as that move spells military disaster. On their left flank it is true that they could protect themselves by detailing Bulgarian forces to watch Bulgaria and so prevent the non-military population from attacking them, but what about their right flank? A very different situation is evident here. On that flank his commanders must reckon with the indomitable

THE ATTACK ON GREEC

By what Routes will Hitler Launch his Onslaught

Greek troops, who are thoroughly at home such mountainous country. Their movements on th class of ground are at least three times as rapid those of any German mountain troops which can detailed to oppose them, and as we know, the Germa Army has not redoubtable mountain troops, unles indeed, they can call in Mussolini's Alpini, who, have it on reliable Greek authority, have of late be attacking the central section of the Greek line advance and have been bloodily repulsed ti after time.

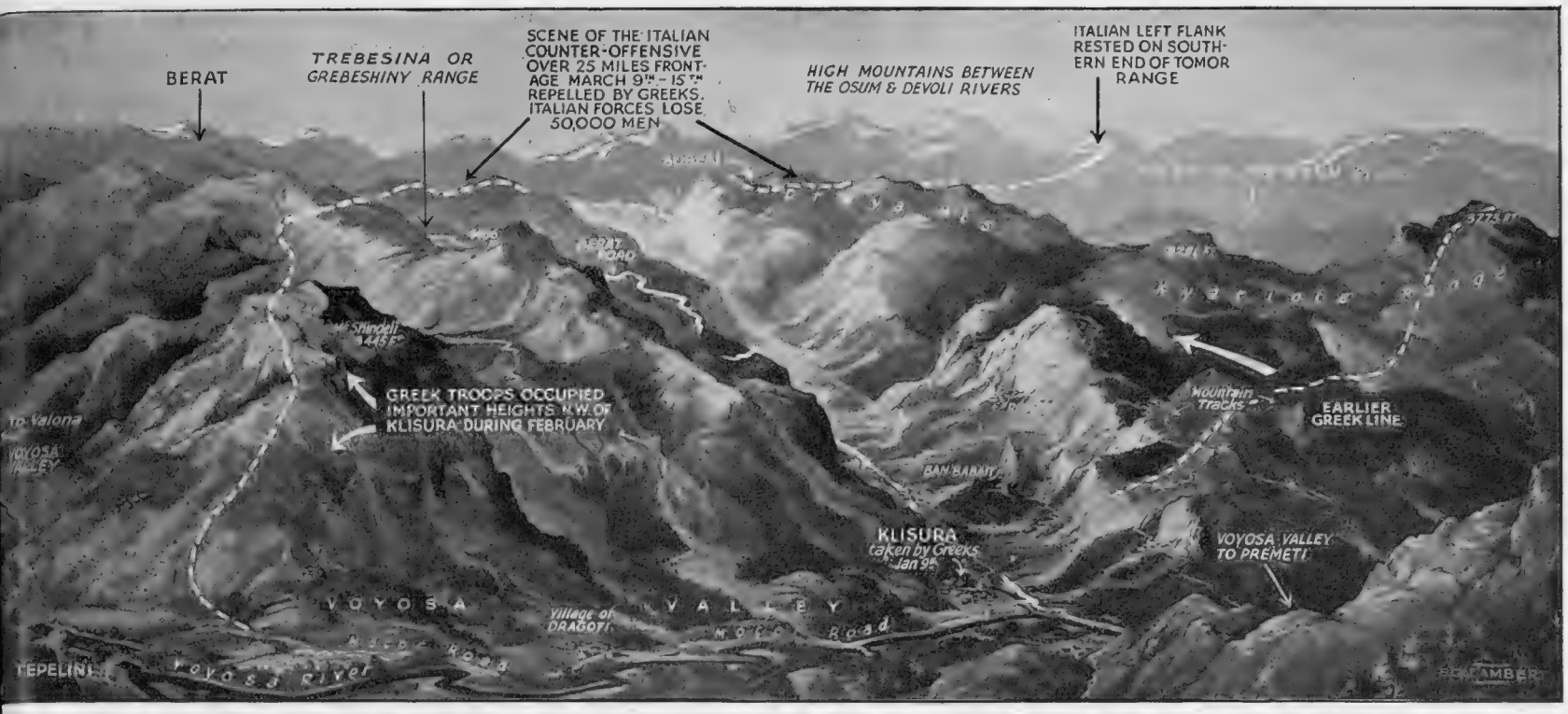
The Greeks can count on active British aid in f measure by sea, land and air; also on Turkish benev lent neutrality for the moment—that is to say, un Hitler discloses his intention to attack *via* Dedeagatc

Then the Turkish President, General Ineune, w give the signal for which the Turks are waiting, a the full force of the Turkish Army—again backed Britain—will ensure complete security to Thrace wit out making it necessary to use the strong retir defensive positions, miles deep, which exist all alo the foothills between the Greek and Bulgarian frontie and the seaboard.

WHERE YUGOSLAVIA FACES RUMANIA AND BULGARIA

The eastern borders of the remaining Balkan neutral a here shown. From the Danube down to near Saloni Yugoslavia and Bulgaria are contiguous: further north s shares boundaries with Rumania; whilst to the west li Albania. Should her communications with Salonika be cu Yugoslavia would have no free access to the Mediterrane

THE CITY AND PORT WHICH THE GERMANS WOULD LIKE TO CONTROL—SALONIKA, KEY-POINT IN THE MEDITERRANEAN, AND CHIEF CITY IN WESTERN THRACE: With its population of 200,000, Salonika has, for centuries, been a prize: until 1912 it was possessed by Turkey, but then it passed to Greece. In the 1914-18 War Salonika played a very great part, serving as the centre for a huge fortified camp occupied by the British-French Forces



THE EVENTS WHICH MAY LEAD TO THE CAPTURE OF TEPELINI: The Sector of the Greek-Italian front in Albania from the Trebesina Range to the Tomor Mountains, where the Italians have been launching their recent very costly, but unavailing offensives

The capture of Tepelini by the Greeks will undoubtedly take place soon, unless something quite unforeseen happens. In this area, attack after attack has been launched against the Greeks in a jumble of mountainous territory; Mussolini himself witnessed the desperate endeavours of his troops and urged them on to fresh trials, but to no avail. Tepelini is the outstanding point in the Italian strategic scheme: from here, and for 20 miles to the north, the Italian counter-attack on Greece—the heaviest since the outbreak of war between the two countries—was developed. Thousands of Italians have been slaughtered by the enfilading fire of the Greeks on the neighbouring mountain summits, and thousands more have been taken prisoner

THE DEFENCE OF THRACE

Another Military Problem which Faces the German High Command

WHILE waging a brilliant offensive defence against the Italian forces, massed in superior numbers against the Greek forces operating in Albania, the Greek High Command has now a second preoccupation. How is the long-drawn-out frontier of Eastern Thrace to be defended against a massed attack by German divisions attempting to force the passes of Rhodope? Although at points roadways lead southward from Bulgaria into this narrow tongue of Greek territory, it is fortunate that there are no superbly graded auto-routes which would give the enemy no opportunity for a rapid advance. For nearly the whole stretch of frontier, no railway at all pierces the mountain barrier. In spite of these difficulties for invasion, the frontier is undeniably a very long one to defend, and it would appear that a much shorter line might have to be considered on the high ground which provides a natural defence for Salonika, which it is generally held would be the immediate bait in any German advance towards the Eastern Mediterranean.

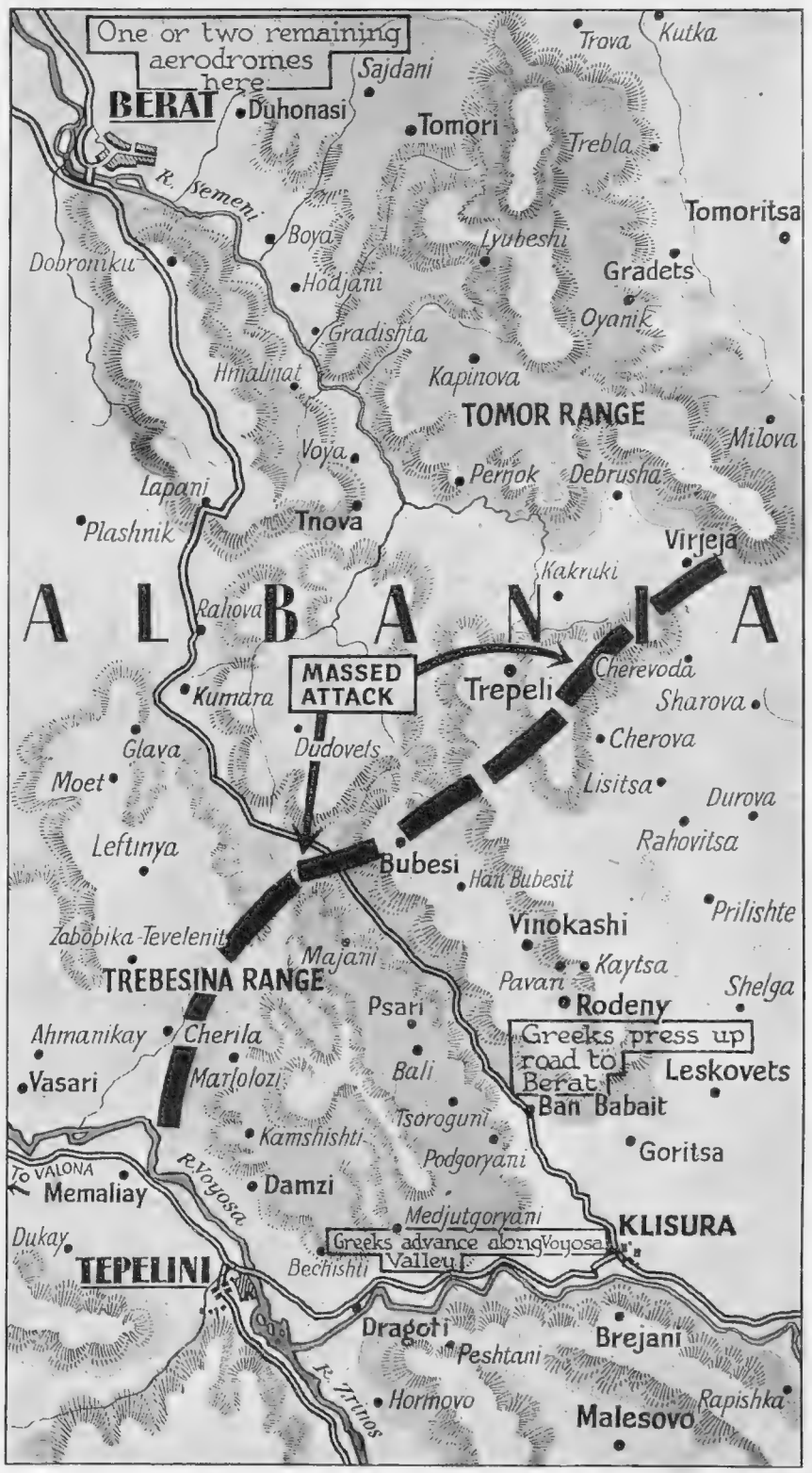
BORDER INCIDENT: During the past few years "incidents" have been frequent on the borders of Bulgaria and Yugoslavia. Some years ago, the Yugoslavs erected trenches and barbed wire, electrically charged, all the way from the northern to the extreme southern boundary. There were no such "fortifications" on the Bulgarian side, however, only soldiers every one or two hundred yards. The Yugoslav border guards were placed much closer

It is possible that Hitler has far-reaching dreams of Eastern adventure, but there can be little doubt that an effort would be made to seize Salonika, as a rich-enough fruit gathered by the way.

The Italians evidently thought it worth striking for by way of Koritza and Florina; unfortunately for them, the Greek army put up such a resistance that Florina was never reached. Students of recent Balkan wars will recall the race of the Greeks and Bulgars for the port after the defeat of some of the ill-led Turkish army corps in 1910. Its commercial importance at the end of the last war was clearly recognised when both Bulgaria and Yugoslavia were given certain rights which enabled them to share in the benefits of Salonika's geographical position.

So certain was the late General Metaxas that a thrust would be made for Salonika, if and when war broke out, that he planned not only a line of defences along his first naturally defended frontier line, but a second line guarded by the Struma river, which in its lower reaches becomes very sluggish and marshy; the Struma marshes south of Seres would probably form as effective a barrier to the rapid use of tanks as the narrow passes through the Rhodope. This marsh region could only be used in the spring.

The chief danger to the Greek defence seems to be in the region to the west of the second defence line described above. This line of attack would entail an entry into Yugoslavian territory in the strip of land which lies between the frontier westwards to Veles, Uskab and Leskovac. This strip of territory lies between the two valleys of the Struma and the Vardar, and it is generally held by military opinion to offer an earlier line of attack for the enemy than any of the more easterly alternatives. The military importance of this area is evidenced by the attempts which have recently been made by German diplomacy to juggle with exchanges of territory which do not actually belong to them, but are offered as baits to Bulgaria and Yugoslavia. If by any jugglery Germany can obtain an entry into this region, she could then make use of the two river valleys of the Vardar and the Struma for the development of an attack, but these probabilities have doubtless been well thought out by the Greek High Command.



On right—**THE FIGHTING LINE FROM TEPELINI TO THE TOMOR RANGE:** The Greeks advanced their line well behind Tepelini, and it was because of this that it was stated, erroneously, that the town had been captured. Tepelini has served the Italians for months as a hinge in their strategic plans

The World of Books—By Vernon Fane

STORIES OF: A SINGER, A SURGEON AND A SOLDIER

Count John McCormack's Success Story; Another "Doctor" Autobiography; Miss Helen Ashton's "Tadpole Hall"

IN the foreword to his biography, JOHN McCORMACK (Methuen. 15s.), Mr. L. A. G. Strong says: "I provide the recitative, he sings the aria." Both of them are fortunate.

Here, indeed, is a rich subject for a biographer. The fourth of eleven children, born at Athlone, on the banks of the Shannon, John Francis McCormack won a scholarship to Sligo College, where he sang in the choir and was soon promoted to sing solos on Feast days and at concerts. One day he was asked to sing at the Town Hall, and he got 5s. for two concerts. Later on in his career he was to make £60,000 in a single year out of gramophone records.

Dr. Kielty, the beloved President of Sligo College, hoped that John McCormack would become a priest. Instead of that he became a Count of the Holy Roman Empire. From the start which Father Hynes gave him at Sligo, McCormack never looked back. He went to Dublin, ostensibly to study for a Civil Service examination, but he never took that examination. "God in his Infinite Providence had evidently given me music as my vocation."

He met Frank Manning, and Vincent O'Brien, and through the generosity of Dr. Dudley Forde he entered for the tenor class at the *Fies Ceoil*, the National musical festival in Dublin. He was the fourteenth, and the last on the list, but he walked off with the gold medal. Incidentally, in the class for basses, one of the competitors, although he did not win the medal, was to be heard of again. His name was James Joyce.

One day he met a Mr. Riordan, who was over to engage Irish artists for the Irish village at the St. Louis Exposition. McCormack was offered a contract for £10 a week and return ticket to St. Louis. He went.

Back home again, he was asked to make ten phonograph cinema records for a fee of £50, and ten other disc records for the same amount. With this £100 in his pocket, McCormack bought himself a stall at Covent Garden to hear Caruso in *La Boheme*. "That voice still rings in my ears," he says, "after thirty-six years. It was like no other voice in the world. The memory of its beauty will never die."

Hearing Caruso set his ambition aflame. He saved every penny he could lay hands on, and finally arrangements were made that he should go to Milan and study under the famous *maestro* Vincenzo Sabatini, the father, incidentally, of Rafael Sabatini, the novelist. The *maestro* had some wonderful material to work on, and from that moment John McCormack was well set upon his singing career.

Thereupon the story becomes one of continuing success. Tour follows upon tour, and the great names of Caruso, Kreisler, Melba, Paderewski, Elgar, Busoni, Clara Butt and the rest of them march across the pages. Then come the difficult years of the war. Difficult because John McCormack and the British public differed in their views. "I should make it quite clear," says Mr. L. A. G. Strong, "that I write as an Anglo-Irishman, born, educated and living in England, whose loyalty to England has never cost him a moment's misgiving or uncertainty. I have always known exactly where my own duties lie and my inclinations lie there too. But I can see more than one side to this Irish-English, English-Irish question, and I have never pretended not to."

Mr. Strong handles that chapter delicately, and in the certain knowledge that there is no one born, either English or Irish, who could possibly see every side of that vexed question. Let it be observed that, in the fullness of time, English audiences once more gave to John McCormack the warm and generous reception which his great talents demanded. It is a very human story, and it is humanly treated by a sympathetic and skilled biographer.

Of books by members of the medical profession there is apparently no end. That is because they have invariably been successful. The doctor touches the lives of most of us intimately and in moments of remembered crisis. The lives of medical men also are usually dedicated to sacrifice and to the service of mankind, a subject which is in soothing contrast to the destructive elements which are let loose all over the world to-day.

IN SEARCH OF COMPLICATIONS (Robert Hale. 12s. 6d.) is the autobiography of Dr. Eugene de Savitsch, M.D. Still a comparatively young man, he escaped from Russia as a boy of fourteen, during the revolution, and sought refuge in Japan. From that moment onwards he has nearly circled the earth, and explored many corners of it.

His early life was one of hardship and of a struggle with the dread disease of tuberculosis, but his ambition was to become a doctor. He struggled through the University, the Pasteur Institute in Paris, the Bunge Institute in Antwerp, and served his apprenticeship in the hospitals of London, Vienna, Heidelberg and Amsterdam.

The Belgian Colonial Administration in the Congo were organising a drive against sleeping sickness, a comparatively new medical field. Dr. Savitsch decided to take part in that drive. His Congo chapters contain some of the most interesting pages of his story.

Dr. Savitsch tells his story with all the tolerance and good humour of a citizen of the world, of a man who is equally at home in London, Paris, New York, Tokyo, or in an African village. His meditations on medical science are also of considerable interest, and in many ways this is an outstanding book.

The months before the outbreak of the war and the months which followed it brought all sorts of disturbing phenomena into the lives of the English countryside, which have since provided a rich vein for novelists to draw upon. There were refugees and evacuees, and there is apt to be an aerodrome close by, as well as the comings and goings of the local inhabitants upon war business.

TADPOLE HALL (Collins. 7s. 6d.) is Miss Helen Ashton's contribution to this now familiar theme. Like everybody else in those days, Colonel Heron and his sister, who kept house for him, had had servant trouble. It was one of those rambling, picturesque country houses, the upkeep of which demanded the smooth administrations of trained servants.

Herr and Frau Hahn were Austrian refugees who took on the job. Herr Hahn was a Jewish lawyer who had suffered torture at the hands of the Nazis, and been driven to the point of mental breakdown. His wife, Lisel, was tall and beautiful and of aristocratic origins. What she lacked as a cook and housekeeper she made up for in Viennese charm. The ex-lawyer did not take to it quite so easily; was sullen, temperamental, and neglected the silver.

Colonel Heron had never liked the idea of engaging this strange pair as servants, but he was a kind and simple person, and very quickly entered into a sort of sympathetic conspiracy with the imperturbable Lisel. Matters were not improved by the uncompromising country-house mistress attitude of Colonel Heron's sister, nor by the arrival of the Colonel's two daughters. The cultivated graces of English country-house life are apt to creak and break down in such circumstances, and particularly when they are complicated by the descent upon the village of the inevitable horde of evacuees, and by the attendant diversions provided by the adjacent aerodrome and by the swains of the Colonel's daughters.

The most successful piece of portraiture in the book is that of Colonel Heron, who captures and retains the reader's sympathy and interest throughout. The rest is told effortlessly and with the grace of the practised novelist.

Mr. Martin Flavin is introduced to a British public as a dramatist with an enviable record of success on Broadway. MR. LITTLEJOHN (Heinemann. 8s. 6d.) is his first novel. It follows the pattern of the story already made familiar in Mr. Somerset Maugham's *The Moon and Sixpence*. Horatio Littlejohn, at the age of fifty-five, and after some years of longing to Get Away from It All, decides to set out in search of himself and of the meaning of Life. In other words, he does a bunk.

He was a mild little man, pot-bellied and bald-headed, with a high blood-pressure and addicted to a diet of milk, sodium and bicarbonate and amil-nitrate. He had made a fortune in a toothpaste company: his employees knew him as a tyrannical martinet. He hated Roosevelt and all his works, and was heartily disliked by his own family. So one day he clapped on a huge black walrus moustache and, arrayed in some fantastic clothes, set out to Find Out About It All.

The situation is as comic as anything conceived by Mr. J. B. Priestley, and the adventures in the picaresque to which Mr. Flavin treats us in Horatio Littlejohn's subsequent adventures are rich in diverse characters and in hilarious incident.

Personally, I enjoyed every word of this story, with its roisterous and roustabout humour, and its shrewd asides on human conduct.

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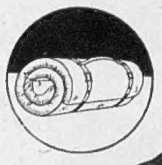

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In Quest of Good Hotels

By ASHLEY COURTENAY

ON more than one occasion I have stressed that it is people who make places pleasant, or otherwise, and how true it is in relationship to the small world cloistered within four walls after black-out . . . an hotel.

This morning I had a letter from a reader which read: "I hate this hotel. There is no character, no personality. Just a money-making concern. A mere hotel where the people sit all day with their eyes glued to books and newspapers, and where the folks are either nearly blind, deaf, or too fat to have ideas on any subject." No wonder she has written me asking for some places where there is more of the human touch.

Though one cannot be responsible for an hotel's inmates, one is rarely in error as to their type when one knows the presiding personnel. There are certain hotels where it is rare to find any misfits. The Digby at Sherborne, for example, which I have recently visited. Forgive the play on the word, but the Digby is dignified. Though company owned, there is no sense of a money-making machine. On the contrary, there is the human touch. I put it down to Mrs. Gispert, the manageress, who has been at the Digby for many years and is blessed with personality and human understanding. She has particular sympathy with those who are forced to have a special diet—and they are a problem these days in hotels. She has the gift, too, of handling both old and young, and with Sherborne Boys' and Girls' Colleges on the doorstep there are plenty of all ages to cater for.

In peace days she had to deal with the motorist—always in a hurry—and to-day there are often in their place officers to cater for, who turn up at all sorts of unorthodox hours.

I have recently, too, had the opportunity of revisiting the Roundabout Hotel at Pulborough, in Sussex, a small licensed hotel which simply exudes tastefulness in furnishings, furniture and food, all the outward signs of Mrs. Kempster's love for everything being—as perfect as can be.

There are, too, plenty of examples of personalities who are rarely in the public eye but remain the whole time behind the scenes. Take the Dudley at Hove, which Mr. F. Kung (a Swiss of much experience) purchased some years ago. Through his personality the character of the Dudley has completely changed, and for the better. Unobtrusively behind the scenes Mr. Kung, his wife, and the rest of his key staff, see to the smooth running of this soul-satisfying hotel. His residents' likes and dislikes, the complaints or praise they may register—all doubtless come to Mr. Kung's ears, yet he is never in the limelight.

In fact, so well is the Dudley run that by a magical device outside his office door you can learn which way the wind is blowing without going outside.

In many of the smaller hotels personalities can become very overbearing, for there is nothing more irritating to some visitors when the management occupy the best table in the dining-room, the lounge and, though it seems very bad business to me, the only stools in the bar. Like Sidney Godolphins (a henchman of Charles II), they should never be in the way, yet never be out of the way . . . when wanted.

There is also a type of personality which is expressed not in person, but in that most appetising form, the art of good cooking. And a love of good cooking is often followed by a knowledge of how to make people really comfortable and at home.

Take the Georgian House at Storrington, Sussex. Discreetly the two Miss Hammonds name it a private hotel on their folder, for, as they told me, they felt the term Guest House was misleading. So it is; yet the term Hotel can be equally confusing, and I would like to follow up the title of Georgian House by adding "the home of the two Miss Hammonds."

For years the White Horse Hotel at Storrington was renowned for its sound English cooking, and now that the Miss Hammonds have left there to open up their Georgian home, they will gain a new reputation for quiet, comfortable and peaceful quarters. But perhaps my favourite personality may prove to be Polly, for as yet I have only met her once. She is the licensee of a tiny inn in a smiling Devon sun-trap. She is seventy, if a day. She has never been to the pictures, and I doubt whether she has ever stepped outside her garden patch. But her rosy face smiles like a Cox's orange pippin, and if I arrive next time after closing hours, I am sure she will gladly . . . put the kettle on.

And now for a word about Easter, because, even if there is no official holiday, nature is unaffected by war, and the primroses, the lambs and the song of the birds insist that you have a break, if not at Easter itself, well thereabouts.

At the time of writing I am informed that there is limited room at East Close Hotel at Hinton in the New Forest, an unusually fine type of country-house hotel 10 miles from Bournemouth. There may be limited accommodation at Woodcote Hotel, Dulverton, from which I write, but double-room accommodation only, and late-comers will have to sleep out.

ANSWERS TO CORRESPONDENTS

E. W. (*Inverness*). — For convalescence you could not do better than take your husband to Cliff Side Hotel or the Sheilings Guest House, Newton Ferrers, South Devon (if they are still open), or the Boscarn Hotel, Looe, which is open.

J. B. R. (*Hindhead*).—Though the Grand Hotel at Grange-over-Sands has been taken over, there is a very excellent country house type of hotel there, Graythwaite Manor, which, to the best of my belief, is still open.

K. C. (*Somerset*).—For a Guide Book on Winchester you had better write to the Town Clerk. The Royal Hotel is old-fashioned and good, though if you wanted something smaller, there is a new Brewers' House on the edge of the town called the Stanmore.

G. A. (*Worcester*).—I am able to answer your questions as follows: The Long Mynd Hotel at Church Stretton, and the Pump House, Llandrindod Wells, not open. The Trefiddian Hotel, Aberdovey: it is a school in term time, but open as an hotel during the holidays. St. David's Hotel, Harlech, still open.

Mr. Ashley Courtenay is always pleased to advise "Sphere" readers of hotels, both large and small, known to him personally. Letters, accompanied by a 2½d. stamp for reply, should be addressed to him, c/o the Editor, THE SPHERE, *Commonwealth House, 1, New Oxford Street, London, W.C.1. Personal and telephone inquiries, however, cannot be accepted.*

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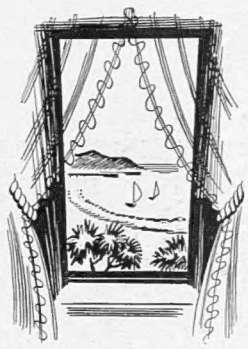

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Continued on facing page

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